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NEW BRUNSWICK'S MINERAL INDUSTRY 1983

edited by
Barbara M. W. Carroll

Mineral Resources Division
Department of Natural Resources
Province of New Brunswick

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PREFACE

This is the seventh in a series of reports on the Mineral Industry of New Brunswick. The information contained within the report, which is not contained in our normal series of reports, will serve as a historical record of exploration, development, mining and government activities as well as related matters that have taken place within the Province during 1983.

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CHAPTER 1. INDUSTRIAL ACTIVITY

VALUE OF PRODUCTION

The drop in copper and silver prices was offset by increases in the price of lead and zinc, thereby accounting for a slight increase in the overall value of minerals produced in New Brunswick for 1983. Preliminary figures for 1983 (Table 1) indicate an increase of 0.03 per cent over 1982 final figures. Metals and fuels show an increase while non-metallics remained unchanged and structural materials experienced a decrease (Figure 1, Table 2). On a province by province basis in 1983, New Brunswick ranked first in the production of bismuth, second in lead, zinc, antimony and peat, third in silver and fifth in copper.

The preliminary value of antimony, copper, gold, lead, silver and zinc produced in 1983 totalled $431,155,000 up from the 1982 final figure of $409,832,000.

The value for non-metallic or industrial minerals totalled $20,047,800 for 1983 which was a decrease of $539,326 from the previous year. Total production remained unchanged in 1983, but included salt and potash from underground development. One potash mine has commenced production.

The value of production of mineral fuels, including coal, oil and natural gas, reached $29,259,129, an increase of 19 per cent over the previous year's figure of $24,630.614.

The value of sand, gravel, cement, clay products and stone produced in 1983 was $33,400,000 compared to $43,241,000 for the previous year, a decrease of 23 per cent. This was due to the continued downturn in the construction industry.

Mining is considered New Brunswick's fastest growing industry as reflected by the capital spending projections from the companies concerned. The value of minerals produced should exceed $1 billion by 1990 and provide more than 7,000 direct jobs by the end of the next decade.

EMPLOYMENT

There were 4,434 people directly employed at producing mines and quarries during 1983. An accurate employment figure for exploration caried out in the Province is not known, but it is estimated to be down about 50 per cent from the previous year. This is indicated from the exploration work reported to the Department. Scientific, technical and administrative staff employed by the Provincial Government in support of mineral resource development totalled forty-three.

TABLE 1

Mineral Production
New Brunswick
1983

Preliminary Estimate

	Units	Quantity	$ Value
METALS			
Antimony	kg	----------	1,084,000
Bismuth	kg	150,000	767,000
Copper	kg	9,101,000	19,037,000
Gold	g	142,000	2,383,000
Lead	kg	73,864,000	43,617,000
Silver	kg	210,000	94,965,000
Zinc	kg	234,175,000	269,302,000
			431,155,000
NON-METALLICS			
Peat	tonne	140,000	11,023,000
Potash	tonne	----------	1,726,663
Quartz	tonne	----------	1,400,000*
Salt	tonne	----------	2,477,137
Sulphur in Smelter Gas	tonne	95,000	3,421,000
			20,047,800
FUELS			
Coal	tonne	564,640	29,211,129
Natural Gas	M^3	2,000	35,000
Petroleum Crude	M^3	----------	13,000
			29,259,129
STRUCTURAL MATERIALS			
Clay Products		----------	1,260,000
Cement	tonne	----------	11,200,000
Lime	tonne	----------	3,540,000
Sand and Gravel	tonne	5,400,000	7,650,000
Stone	tonne	2,140,000	9,750,000
			33,400,000
PRELIMINARY TOTAL 1983			513,861,929
January, 1984			

* This is 1982 figure; 1983 production not available.

The Mineral Production of New Brunswick

1956 to 1983

Date Calendar Year	Metals	Non-Metallics	Fuels	Structural Materials	Total
1956	$ 337,234	$ 744,262	$ 8,155,040	$ 9,021,766	$ 18,258,302
1957	4,789,658	951,178	8,424,346	9,056,683	23,221,865
1958	1,114,700	944,321	6,964,888	8,576,845	17,600,754
1959	-----	941,330	8,533,822	8,636,080	18,111,232
1960	-----	1,101,722	8,834,749	7,136,268	17,072,739
1961	-----	1,379,335	7,686,695	9,738,355	18,804,385
1962	3,483,969	1,571,082	6,900,984	9,855,540	12,811,575
1963	9,255,246	1,224,450	7,352,023	10,511,700	28,343,419
1964	29,648,079	1,099,685	8,573,688	9,355,260	48,676,712
1965	62,461,357	1,742,662	8,742,980	9,210,353	82,158,352
1966	69,386,294	1,894,992	8,005,535	10,934,416	90,221,237
1967	67,957,099	2,427,150	7,568,509	12,465,932	90,418,690
1968	69,622,942	2,915,246	7,436,931	8,476,317	88,451,436
1969	77,562,887	3,603,831	5,757,473	7,668,374	94,592,565
1970	89,939,781	2,785,381	3,086,033	8,979,360	104,790,555
1971	91,049,256	2,902,648	4,038,971	9,242,071	107,232,946
1972	98,772,724	3,820,526	3,552,863	14,024,867	120,170,980
1973	132,797,907	4,243,694	3,434,416	23,701,754	164,177,771
1974	184,142,991	5,742,863	5,441,537	21,255,701	216,583,092
1975	197,230,888	6,252,923	7,473,197	20,965,912	231,922,920
1976	195,340,976	7,163,466	5,988,243	30,090,493	238,583,178
1977	238,583,350	10,037,550	6,333,791	34,439,352	289,394,043
1978	281,770,379	11,467,716	8,811,135	37,670,743	339,719,973
1979	419,123,591	11,658,369	10,394,844	38,510,412	479,687,216
1980	302,674,000	13,192,293	17,282,186	40,981,000	374,129,479
1981	452,580,000	16,666,976	23,325,535	39,769,000	532,341,511
1982	409,832,000	20,587,126	24,630,614	43,241,000	498,290,740
1983 (P)	$431,155,000	$20,047,800	$29,259,129	$33,400,000	$513,861,929

January 28, 198

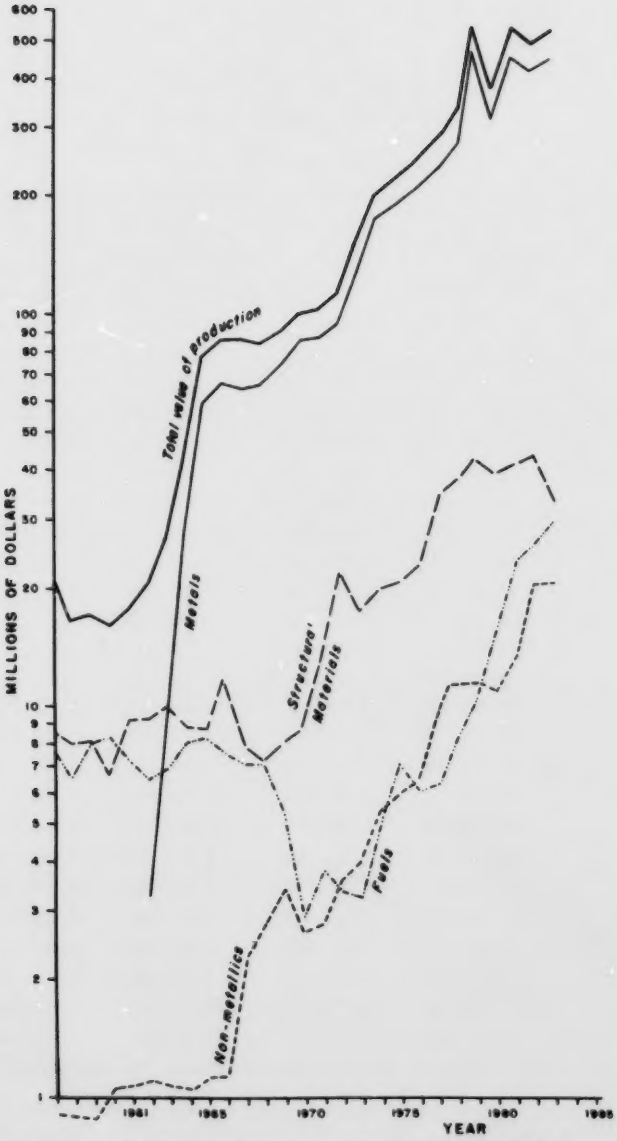

Figure 1. Value of mineral production 1957-1983

MINING AND DEVELOPMENT

The non-renewable resource producers in New Brunswick are shown in Figure 2. The metal mines in production during the year were Brunswick Mining and Smelting Corporation Limited (No. 6 and No. 12), Heath Steele Mines Limited, Mount Pleasant Tungsten Mine and Anaconda (Caribou) Mines Limited. The No. 6 mine of Brunswick Mining and Smelting Corporation Limited ceased operations in the fall due to depletion of the ore body. Heath Steele Mines shut down its sulphide operation in 1983 because of low metal prices. The mill was converted to a gossan treatment plant which started operation on July 18, 1983. Anaconda completed its gold and silver production from the gossan ore located on its Caribou property.

At 1983 metal prices and the world's refining capacity, the economics of constructing the proposed zinc reduction plant was found not feasible.

Consolidated Durham Mines and Resources Limited operation at Lake George remained closed during the year; however, the property was kept on a maintenance basis.

The newest metal mine operation, Mount Pleasant Tungsten Mine, started up their tungsten circuit in December. Approximately 245 people are now employed at the mine.

Another mine, that of the Potash Company of America, commenced potash production in July 1983 (Figure 3). The sinking of the second shaft at the Denison-Potacan potash property at Cassidy Lake continued during the year. Production from this mine is expected to commence in September 1985. BP Exploration Canada Limited completed two more drill holes on their Millstream property early in the year and were evaluating the information obtained. Altogether the three potash properties created direct employment for 559 people during 1983.

Coal production at the Grand Lake operation of N.B. Coal Limited was 564,640 tonnes in 1983 (498,480 tonnes in 1982). Virtually all of the production was sold to the New Brunswick Electric Power Commission's thermal plants.

Canada Cement Lafarge Limited continued to operate its cement manufacturing plant at Havelock; however, the kiln operation was shut down in mid-year due to the adverse market situation. The limestone producers, Havelock Lime Works, Elmtree Resources Limited and Brookville Manufacturing Limited, continued operation throughout 1983. Chaleur Silica Limited provided quartz flux for the lead smelter at Belledune.

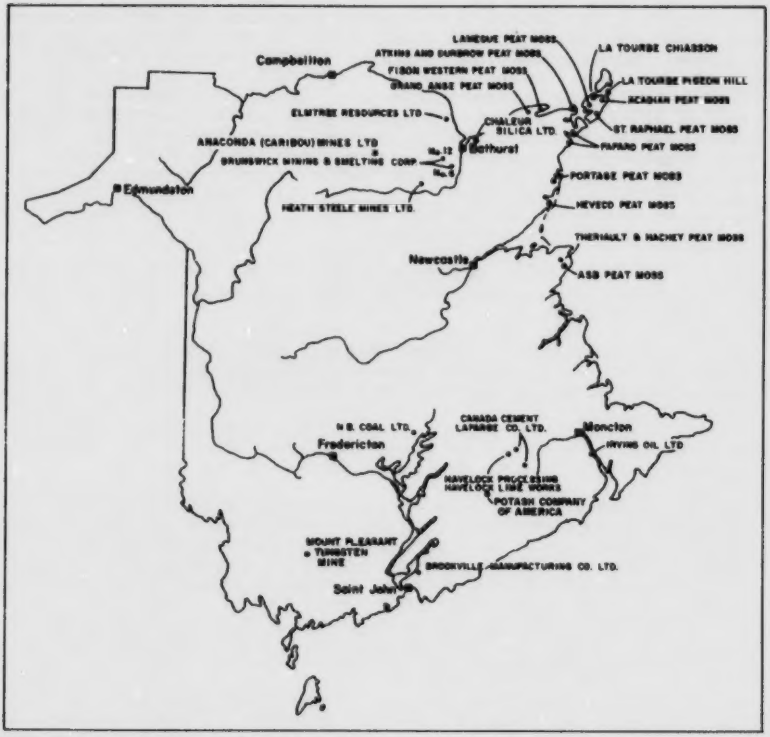

Figure 2. Non-renewable resource producers in New Brunswick in 1983

Major aggregate producers, i.e. Brunswick Ready Mix Limited, Acadia Crushed Stone Limited, Moncton Crushed Stone Company Limited, Forbes and Sloat Limited, Diamond Construction Limited, MacDonald Paving and Construction Limited and Brookville Manufacturing Company Limited continued production during the year. Nelson Monuments Limited, the Province's major producer of ornamental stone continued production during 1983 using stone imported from Ontario.

Figure 3. Potash Company of America potash shipping terminal, Saint John.

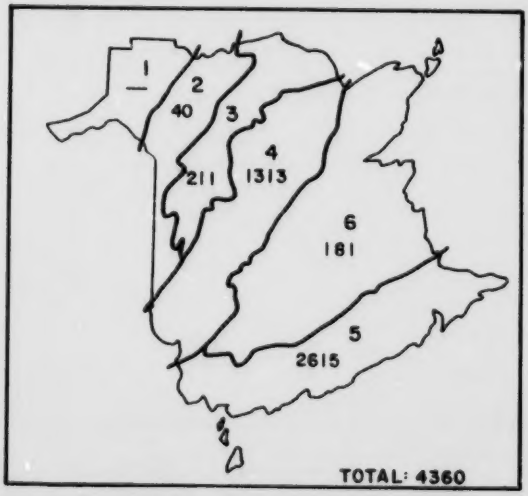

Figure 4. Number of claims staked in New Brunswick by metallogenic region in 1983.

EXPLORATION

Exploration activity in New Brunswick reported from all sectors continued to decline in 1983, with respect to the previous four years. The Bathurst-Newcastle area continued to receive attention from a number of companies and individuals (Figure 4). Although zinc, lead and copper were the main minerals sought, attention was being focused on the gold potential of the area. In southern New Brunswick, interest was directed primarily towards tin-tungsten and gold exploration.

The number of claims recorded in 1983 totalled 4,360, more than double the figure from the previous year (Figure 4). Companies most active included Brunswick Mining and Smelting Limited, Billiton Canada Limited, and Lac Minerals Limited. However, a large number of smaller companies and individual prospectors were busy during the year, particularly in the Saint John region where gold discoveries were announced early in 1983.

An extensive seismic survey was carried out in the southern part of the Province by Chevron-Irving interests. More than 1,000 km has been surveyed to date, and the company intends to continue exploration in 1984. Detailed work by these companies in the Bay of Fundy was also followed up in 1983 by the drilling of the Cape Spencer well by the Glomar High Island IX jack-up rig. This hole, drilled to a depth of 2,587 metres, was completed early in November and no hydrocarbons were encountered.

The value of assessment work received in 1983 totalled $2.1 million (Figure 5). In addition to this value, $0.5 and $14.1 million were reported for coal, and oil and natural gas exploration respectively, and $1.3 million was spent on potash exploration. The total value of exploration in 1983 is estimated to have been in excess of $17.5 million.

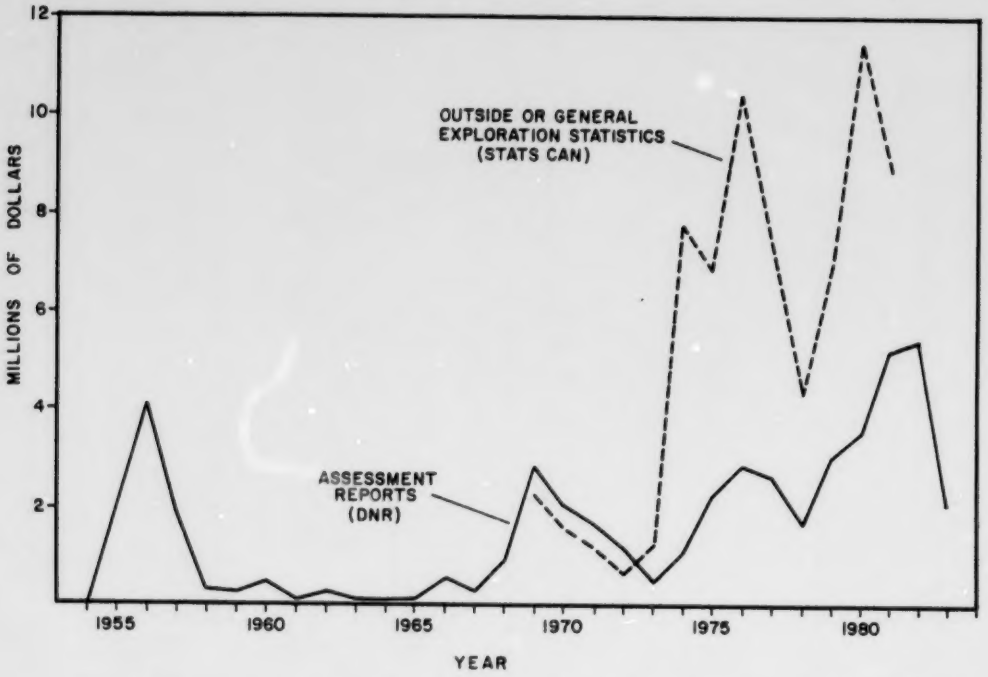

Figure 5. Exploration expenditures reported for assessment credit, 1955 - 1983

CHAPTER 2. GOVERNMENT ACTIVITY

MINERAL RESOURCES DIVISION

The Mineral Resources Division is one of five divisions of the Department of Natural Resources (Figure 6). The Division consists of two branches: the Geological Surveys Branch and the Mineral Development Branch; and two sections: Administration and Mineral Lands (Figures 7a, 7b, and 7c).

ADMINISTRATION SECTION

The operating budget for the Mineral Resources Division for the fiscal year 1983-84 amounted to $2,041,300 which represented a six per cent increase over the previous year. This amount breaks down as follows: 67 per cent personnel services, 19 per cent other services, 11 per cent materials and supplies and 3 per cent property and equipment. Table 3 presents a historical review of expenditures, staff and revenue. Details of the staffing of the Mineral Resources Division are given in Figures 6, 7a, 7b, 7c and Table 4.

The section is staffed as follows: Wayne Carr, Administrative Services Officer; Sandra DeVenney, Administrative Services Officer; Carol LeBlanc, Clerical Officer; Shelley Stephens, Receptionist at Fredericton; while Freda Kelly, Clerk-Typist and Sharon McKinnon, Administrative Services Officer, are in Sussex and Bathurst, respectively.

This was the eighth and final operating year of the Minerals and Fuels Subagreement. Budgeting for this programme and its projects was the work of a steering committee; however, budget control, purchasing and staffing was the responsibility of the Mineral Resources Division, Administration Section. Funding for GDA programmes was controlled by the Community Improvement Corporation and was provided on an 80-20 basis by the Federal and Provincial governments, respectively (Figure 8).

	Spending Level	Expenditures	Differences (Over) or Under
Primary 3	$1,380,300.00	$1,434,258.30	$(53,958.30)
Primary 4	407,500.00	398,601.60	8,898.40
Primary 5	208,000.00	96,896.61	111,103.39
Primary 6	45,500.00	43,382.46	2,117.54
	$2,041,300.00	$1,973,138.97	$ 68,161.03

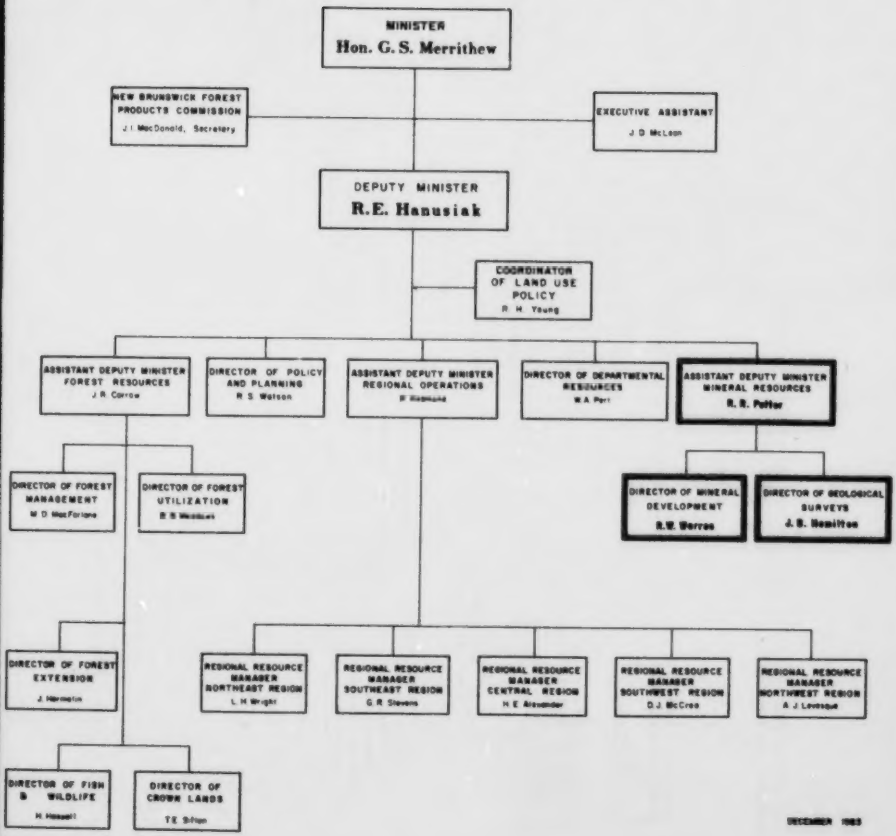

Figure 6. Plan of organization, New Brunswick Department of Natural Resources

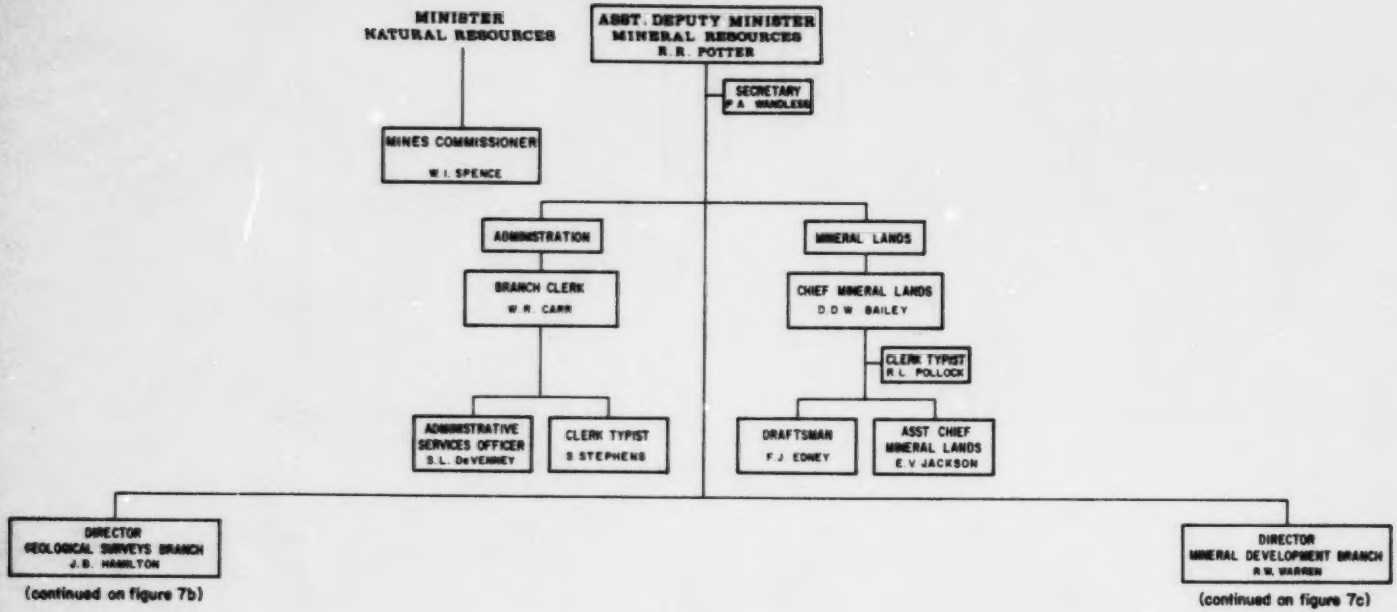

Figure 7a. Plan of Organization, Mineral Resources Division

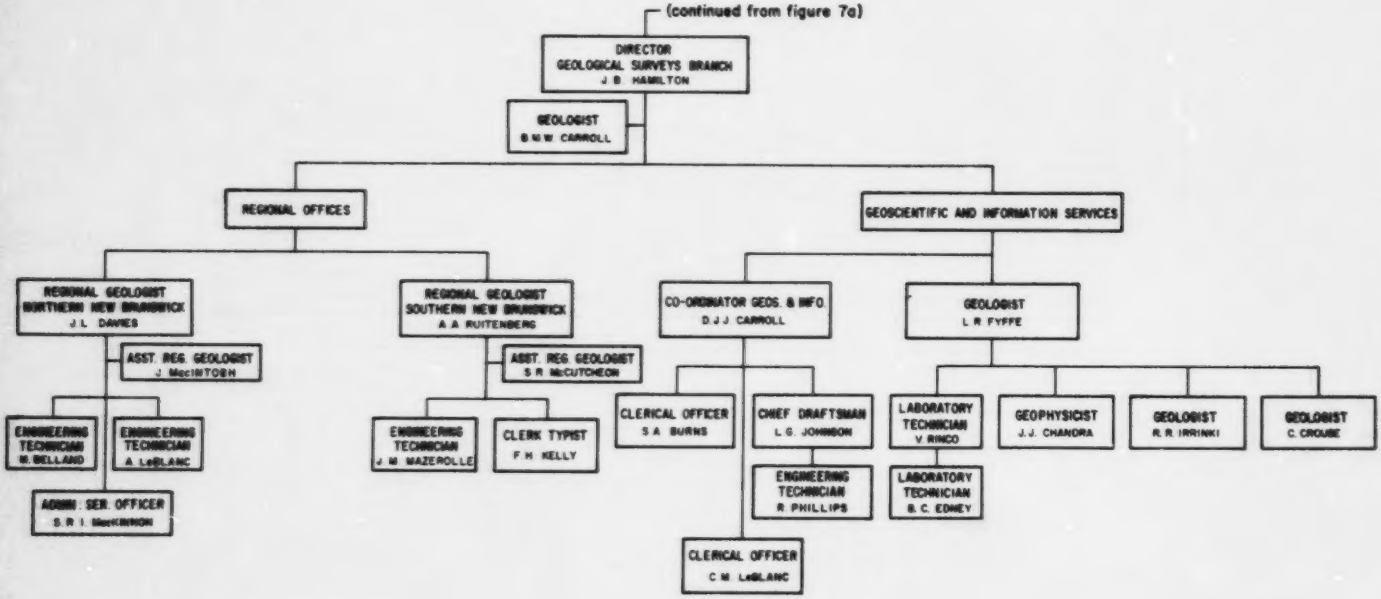

Figure 7b. Plan of Organization, Mineral Resources Division (Geological Surveys Branch)

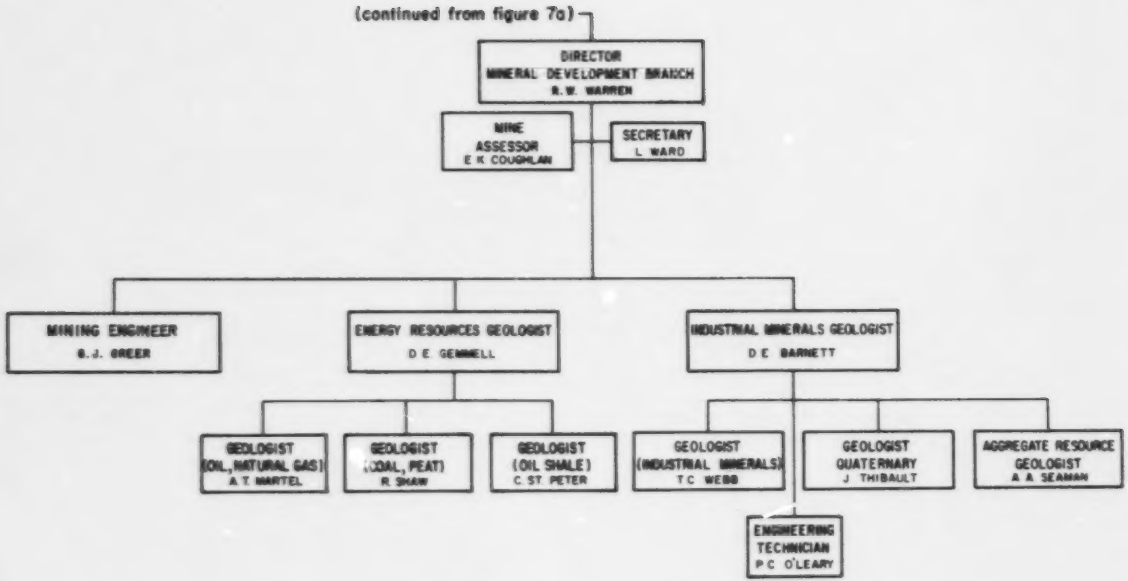

Figure 7c. Plan of Organization, Mineral Resources Division (Mineral Development Branch)

TABLE 3

Mineral Resources Division
Expenditures, Staff, Revenue 1964-1983

YEAR	PROV. PROJECTS(1)	EXPENDITURES					STAFF			REVENUE
		ADMIN.	TOTAL(2)	DREE PROJECTS(3)	TOTAL(1)&(3) PROJECTS	TOTAL(2)&(3) EXPENDITURES	PERMANENT	CASUAL	TOTAL	TOTAL REVENUE
1964-65							20			384,877
1965-66						274,663	24			908,502
1966-67						329,292	26			563,404
1967-68						381,478	27			278,464
1968-69						341,871	28			292,257
1969-70						321,162	25			417,949
1970-71	75,110					626,289	27	13	40	319,278
1971-72	136,170	294,151	430,321	367,953	504,123	798,274	27	13	40	303,030
1972-73	129,702	319,582	449,284	455,389	585,091	904,673	29	13	42	233,525
1973-74	197,700	405,614	603,314	923,705	1,121,406	1,527,020	29	13	42	592,550
1974-75	128,127	470,027	598,154	786,158	914,285	1,384,312	30	13	43	2,165,711
1975-76	166,348	614,054	780,402	844,190	1,010,538	1,624,592	30	13	43	2,561,456
1976-77	203,048	706,469	909,517	1,347,114	1,550,162	2,256,631	30	13	43	863,888
1977-78	241,796	746,938	988,734	1,508,004	1,749,800	2,496,738	29	14	43	1,135,828
1978-79	147,201	916,212	1,063,413	2,167,640	2,314,841	3,231,053	30	13	43	3,040,492
1979-80	125,421	672,358	797,779	1,493,886	1,619,307	2,291,665	36	12	48	10,736,752
1980-81	241,974	725,921	967,895	1,387,844	1,629,818	2,355,739	36	12	48	8,141,862
1981-82	263,715	900,935	1,164,650	1,401,048	1,664,763	2,565,698	36	13	49	7,887,661
1982-83	744,943	1,181,079	1,926,022	473,035	1,217,970	2,399,060	43	4	47	5,553,900
1983-84	737,490	1,303,810	2,041,300	26,024	763,514	2,067,324	43	4	47	3,993,531

TABLE 4

Staff - Mineral Resources Division

Year	Mines or Mineral Development						Mineral Resources or Geological Surveys						
	Admin	Geologist Mining Eng	Tech	Steno Secty	Draft	Total	Admin	Geologist Mining Eng	Tech	Steno Secty	Draft	Total	Total Division
1953-54	1	1	1	3	-	6							6
1954-55	2	1	1	4	-	8							8
1955-56	4	-	3	6	2	15							15
1956-57	4	-	3	8	2	17							17
1957-58	5	1	2	9	2	19							19
1958-59	5	1	2	9	2	19							19
1959-60	5	1	4	10	1	21	INCLUDES MINERAL LANDS						21
1960-61	5	1	3	10	1	20							20
1961-62	5	1	2	10	2	20							20
1962-63	5	1	2	11	2	21							21
1963-64	5	1	2	10	2	20							20
1964-65	5	2	2	9	2	20							20
1965-66	5	6	3	8	2	24							24
1966-67	5	8	3	8	2	26							26
1967-68	2	-	3	-	-	5	3	9	1	7	2	22	27
1968-69	2	-	3	-	-	5	3	10	1	7	2	23	28
1969-70	2	-	3	-	-	5	3	7	1	6	3	20	25
1970-71	3	-	2	-	-	5	3	7	4	5	3	22	27
1971-72	3	-	2	-	-	5	3	7	4	5	3	22	27
1972-73	3	-	3	-	-	6	3	8	4	5	3	23	29
1973-74	3	-	3	-	-	6	3	8	4	5	3	23	29
1974-75	3	-	3	-	-	6	4	8	3	6	3	24	30
1975-76	3	-	4	-	-	7	4	8	2	6	3	23	30
1976-77	3	-	4	-	-	7	4	8	2	6	3	23	30
1977-78	4	-	6	-	-	10	2	8	2	4	3	19	29
1978-79	2	-	5	-	-	7	4	9	3	5	3	24	31
1979-80	-	-	-	-	-	-	4	13	6	8	3	34	34
1980-81	-	-	-	-	-	-	8	13	6	8	3	38	38
1981-82	2	6	1	1	-	10	6	8	7	6	2	29	39
1982-83	5	8	1	3	1	18	5	9	6	4	1	25	43
1983-84	6	8	3	5	2	24	6	8	4	1	-	19	43

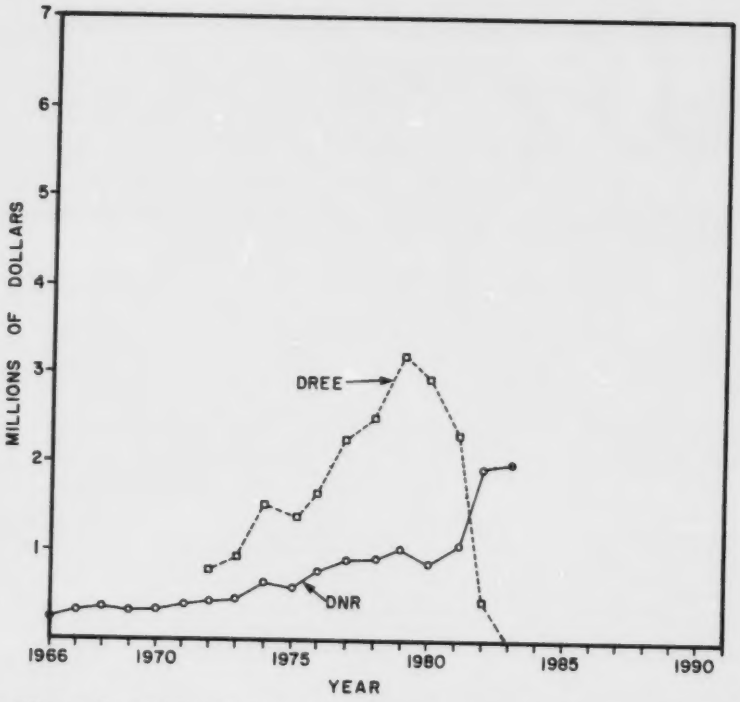

Figure 8. Budget of Mineral Resources Division 1966-1983

The Division was overspent in Primary 3 but underspent in Primaries 4, 5 and 6 which represents an underexpenditure of $68,161.03.

The total expenditures for the Mineral Resources Division, including GDA budgets, is as follows:

Budgets	Vote	Expenditures	
Minerals & Fuels	40	$ 26,023.77	
	58	84,521.82	
Total GDA			$ 110,545.59
Provincial Budget	19	$2,041,300.00	
Total Provincial			2,041,300.00
Grand Total		$2,151,845.59	$ 2,151,845.59

NOTE: Vote 40 is for ordinary account under GDA agreements.
Vote 58 is the Capital Expenditures under GDA agreements.
Vote 19 is the ordinary account for Provincial Budgets.

MINERAL LANDS SECTION

The Mineral Lands Section processes and maintains records pertaining to the disposition of Crown-owned minerals. Mining claims are recorded and prospecting liconces are sold at Fredericton and the Regional Offices at Bathurst and Sussex.

The Mineral Land staff consists of D.D.W. Bailey, Executive Officer; E.V. Jackson, Administrative Services Officer; Fred Edney, Draftsman; and Mrs. Rhonda Pollock, Clerk-Typist III.

Table 5 presents mineral lands statistics for 1983.

Table 5
EXPLORATION STATISTICS - 1983

	No.	Claim Equivalent	Hectares	% Inc. Over Prev. Year (Decrease)
Prospecting Licences Sold	178			(48.6)
Claims Recorded	4,360		69,760	139.3
Claims Renewed	7,113		113,808	(42.3)
Claims Expired	5,827		93,232	(13.6)
Claims Converted to Mining Licences		488	7,808	(45.7)
Mining Licences Renewed		10,809	172,944	.5
Mining Licences Expired		709	11,344	261.3
Potash Leases in Effect		1,734	28,074	0
Other Leases in Effect		397	6,427	0
Total Claims or Claim Equivalents in Effect		24,901	398,416	(11.4)
Oil-Gas Licences	53		1,280,773	6
Oil-Gas Leases	1		2,157	0
Bituminous Shale Licences	-		-	(100)
Bituminous Shale Leases	1		1,439	0
Underground Storage Licences	-		-	0
Underground Storage Leases	-		-	-
Quarry Permits	277		112	28.8
Quarry Leases	6		439.2	20.0
Peat Licences	3		1,064	(29)
Peat Leases	21		9,048	23
Potash Exploration Reservation	1		10,125	-
Assessment Reports Submitted	68			(58.6)
Value of Assessment Reports Received	2,169,456			(45.0)
Total Drilling (Metres)	9,923			(31.2)
Drilling Value	$612,234			(32.8)
No. of Holes	55			(37.4)
	No.	**Depth (meters)**	**$**	
Potash Exploration Expenditures			1,270,000	
No. of Holes	2			
Total Depth		2,015		
Oil-Gas Exploration Expenditures			14,076,060	
No. of Holes	1			
Total Depth		2,587		
Bituminous Shale Exploration Expenditures			0	

GEOLOGICAL SURVEYS BRANCH

The Geological Surveys Branch was formally established in 1980, although it may be said to have actually come into existence with the introduction of the Mining Act of 1927. In 1928, Dr. W.J. Wright was appointed Provincial Geologist. Shortly after, and over the years, he initiated many of the functions that have become the responsibility of the Geological Surveys Branch. The rather rigid distinction that existed in the early days between the roles of the Geological Survey of Canada, the "University" and the Provincial Government with respect to mineral resource studies has been blurred in recent years. Formerly the Geological Survey of Canada tended to restrict its activities to regional matters, the "University" to academic matters and the Department of Natural Resources to economic geology, mine safety and resource administration. With the increasing importance of mineral resources to the provincial economy, and the changing geoscientific priorities of the Geological Survey of Canada, the Department of Lands and Mines (since renamed Department of Natural Resources) responded by expanding the scope of its activities beyond its traditional role. In the mid-1960's, using provincial funds, and through the hiring of technical specialists, introducing basic data-gathering projects, establishing regional geological offices, etc., the Mines Division was able to meet the added responsibilities that had first arisen out of the finds in the Bathurst-Newcastle camp a decade or so earlier. The resulting geological effulgence accompanying the Departmental reorganization of 1965 dominated the activities of the Mineral Resources Division throughout the seventies and early eighties. It was a period in which the effects of Federal-Provincial minerals agreements overshadowed all other activities of the Division. In fact, these agreements moulded the organization and its present-day character is derived, in no small part, from that heritage.

The year 1983 was a significant one as far as the Geological Surveys Branch is concerned. It was the first year of operation following the termination of Federal-Provincial mineral programs--the first year in twelve in which Federal mineral resource priorities were not expressly contained in the Branch's projects. This return to reduced activities has been accompanied by a careful assessment of priorities and long-term goals in order that the Branch's responsibilities can be met (Figure 9).

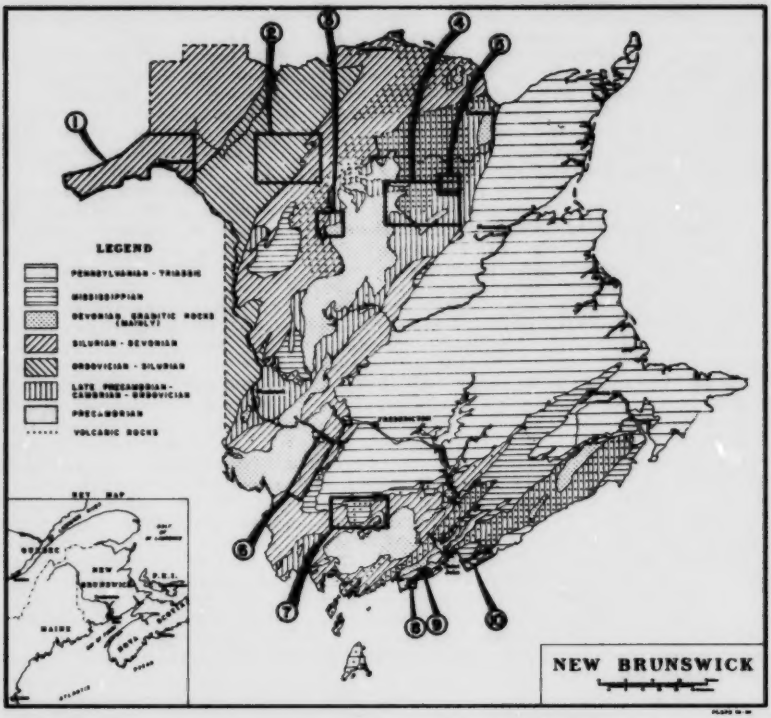

Figure 9. Areas in which Geological Surveys Branch projects were carried out in 1983

1. Stream silt survey (21 N/1,2,7,8)
2. Geological mapping, Sisson (21 O/6)
3. Till geochemistry, Mt. Costigan-Long Lake (21 J/14,15; 21 O/2,3)
4. Geological mapping, Big Bald Mountain (21 O/1)
5. Geological mapping (part of 21 O/1,8)
6. Gravity survey (21 G/11, 14)
7. Geological mapping, Mt. Pleasant Caldera (21 G/7,10)
8. Geological mapping, Chance Harbour (21 G/1)
9. Geological mapping, Musquash Harbour (21 G/1)
10. Geological mapping, Cape Spencer-Black River (21 H/4)

The prime responsibility of the Geological Surveys Branch is for the collection and dissemination of information concerning all aspects of New Brunswick's geology and encouraging exploration, discovery and the wise use of mineral deposits. This role is particularly useful to those engaged in developing the mineral industry of the province, but it is also highly significant to those who must develop sound resource policies and in planning the wise use of land. Although most of the information gathered by the Geological Surveys Branch is primarily used for mineral exploration, knowledge of geology is increasingly being used as a basis for land-use planning, environmental assessment, groundwater resource studies and engineering purposes. The overall objectives of the Branch are to provide a complete, up-to-date and comprehensive inventory and analysis of geology and mineral deposits of New Brunswick, to stimulate exploration and facilitate sound planning in all matters related to mineral and earth resources. Special emphasis is placed on:

Collecting and disseminating geoscience information and identifying potential mineral resource areas.

Maintaining and providing comprehensive information about the nature, extent and amount of New Brunswick's known mineral deposits.

Identifying and analysing geological features and processes affecting land use, urban development, etc.

Encouraging and promoting public understanding and participation in mineral exploration by providing information about geology and mineral prospecting to the general public.

Bathurst Regional Office

The staff of the Bathurst Regional Office comprises J.L. Davies, Regional Geologist; J.A. MacIntosh, Assistant Regional Geologist; Sharon McKinnon, Administrative Officer; Maurice Belland, Technician and André LeBlanc, Technician.

PROGRAMMES (Figure 9) Geological mapping was carried out in 1983 by R.R. Irrinki and G. Crouse in the Sisson map area (21 O/6). The results are expected to be published in 1984 on a scale of 1:50,000. R.R. Irrinki mapped the Big Bald Mountain area (21 O/1). Work continued on map-area O-9 (one-quarter mile map series) by J.A. MacIntosh, but because of funding cuts for summer help, the mapping could not be completed. It is hoped that funds will be available in 1984 to complete this map area.

J.L. Davies began a study of gold occurrences in northern New Brunswick, in order to assess the gold potential of the region. Geological mapping was also carried out in the towns and villages of Chatham, Perth-Andover and Drummond at the request of the N.B. Department of Municipal Affairs. This work will be completed in 1984.

L.R. Fyffe and T. Pronk carried out a pilot study on the volcanic-plutonic terrane of the Trousers Lake area (parts of 21 O/2, 21 O/3, 21 J/14, 21 J/15) to investigate the usefulness of till geochemistry in the search for mineral deposits. A.A. Seaman and J. Thibault mapped the surficial geology and aggregate resources of the Nepisiguit Lake (21 O/7) and Sisson (21 O/6) map-areas. Till samples collected in these areas will also be used to assess their value in mineral deposit exploration.

A contract stream silt survey was carried out in Madawaska County (parts of 21 N/1, 21 N/2, 21 N/7 and 21 N/8) in the northwestern part of New Brunswick by Geosleuths and Three-D GeoConsultants in 1983. Analyses of samples has been completed, and the results should be ready for publication in the form of computer-produced maps in mid-1984. The results of 1982 surveys in the Riley Brook (21 O/3W) and Sisson (21 O/6) map areas are expected to be released in a similar form in 1984.

T.G. Mersereau was contracted to study the methods and costs of compilation of geoscientific data for northern New Brunswick. His report and conclusions are to be submitted to Geological Surveys Branch in 1984. Provincial funds are being sought to begin the three- to five-year compilation programme. Meanwhile Maurice Belland is continuing his efforts to compile geological and geophysical data, primarily in the Miramichi Zone.

CORE STORAGE The core storage library at Madran is now full. A catalogue listing all core stored at Madran and the Bathurst Regional Office is in preparation. Core was received in 1983 from Canadian Occidental Petroleum (Long Lake), BP Canada (West Wedge), Heron Mines (Turgeon) and Noranda Exploration.

OTHER ACTIVITIES Revisions of several previously published quarter-mile series geology map (M-6, O-5, P-3, P-4, P-5, P-8 and Q-7) are in preparation, but require additional field work before they can be re-issued. Compilations of 1:50,000 geology maps of Nepisiguit Falls (21 P/5) and Tetagouche Lakes (21 O/9) are in various stages of development.

Approximately 152 mineral occurrences have been identified in northern New Brunswick. These range from relatively minor gold-silver quartz veins to huge masses of pyritic Zn-Pb-Ag-Cu ore such as the Brunswick No. 12 deposit and from relatively small occurrences of apatite to large deposits of limestone and dolomitic limestone. Summaries of these occurrences are now being revised and rewritten.

Field tours were conducted for individuals and school groups including one for IGCP Project 60, concerning Caledonian-Appalachian stratabound massive sulphide deposits. The Regional Geologist attended the project's closing symposium in Ottawa, September 1983.

The Regional Geologist continued to review forestry plans for northern New Brunswick (three forest regions), so that potential conflicts between forestry and mineral exploration could be avoided. No serious problems arose in 1983.

PUBLICATIONS The following report and maps were released in 1983:

Davies, J.L., Fyffe, L.R., and McAllister, A.L. 1983. Geology and massive sulphide deposits of the Bathurst area. In Field Trip Guidebook, Bathurst area and west-central New England, U.S.A. Edited by D.F.Sangster, Geological Survey of Canada, Miscellaneous report 36, 76 p.

Davies, J.L. 1983. Stream sediment geochemistry maps. N.B. Department of Natural Resources, Mineral Resources Division, Plates 83-61a-i, 83-62a-i, 83-63a-i, 83-64a-i (parts of 21 O/10 and 21 O/11) scale: 125,000. Plate 83-33a-k (21 O/2),scale: 1:50,000.

Sussex Regional Office

The Sussex Regional Office is staffed by A.A. Ruitenberg, Regional Geologist; S.R. McCutcheon, Assistant Regional Geologist; M.R. Mazerolle, Engineering Technician and F.H. Kelly, Clerk-Typist.

PROGRAMMES (Figure 9) S.R. McCutcheon completed geologic mapping of the Mount Pleasant Caldera. The objective of the project was to relate the emplacement of mineral deposits to the stratigraphic and structural evolution. This provides an effective basis to explore the region for tin, tungsten and molybdenum deposits.

A.A. Ruitenberg continued a gold potential survey in the Bay of Fundy coastal area. Geological mapping projects were conducted in the Cape Spencer-Black River, Chance Harbour and Musquash Harbour areas. Diamond drill core that was available at Cape Spencer during the beginning of the field season was logged and the geologic map was revised accordingly. The objective of the project is to relate gold deposits and occurrences to the regional stratigraphic and structural evolution of the belt and thus provide a reliable basis for gold exploration.

The regional office staff continued co-operation with H. van Groenewoud, of the Maritime Forest Research Centre, on a long-term project to determine the relationship of forest productivity with soil-geologic parameters in New Brunswick. The forest site classification that was developed from research in northern New Brunswick was successfully tested in the southern part of the province.

Field trips were provided for a variety of organizations. These included the members of the New Brunswick Prospectors and Developers Association, graduates of the prospecting course sponsored by the Department of Natural Resources, the Atlantic Universities Geological Conference, the Bailey Geological Society and a delegation of the Nova Scotia Department of Mines and Energy. A field trip to the gold deposits of Nova Scotia and underground tours of Mount Pleasant and Brunswick Mines were attended.

Consultations were provided for numerous exploration geologists and prospectors during the year. Geologic investigations of four water well sites were also made in the Sussex area.

A variety of activities were carried out during the winter season. Geologic maps of the Mount Pleasant Caldera and several gold-bearing areas in the Bay of Fundy coastal zone were prepared for publication. Thin sections from different rock units were examined microscopically.

Geologic maps of the Annidale-Nerepis area, at a scale of 1:50,000, were prepared for publication and sent out for printing. The accompanying report also was revised and updated

following editorial remarks. Reports by M.J. McLeod on the bedrock geology of the Salmon River-Goose River area and by R. Thomas et al., on the geochemistry and surficial geology of the eastern St. George Batholith were edited and revised. L.R. Fyffe and the regional office staff, respectively revised and edited the report by G.G. Lutes on the Pokiok Batholith. Reports on the environmental geology of North Head and the Town of St. Andrews were completed at the request of the Department of Municipal Affairs. A report was prepared on the soil geology related to forest productivity in the Mount Pleasant area. Two chapters on bedrock and soil geology, respectively, were prepared for a forest site classification manual commissioned by the New Brunswick Forest Site Classification Council.

Exhibits on the mineral deposits of the region were prepared for the Annual Open House in Fredericton and the Prospectors and Developers Association Meeting in Toronto.

PUBLICATIONS The following geologic reports and maps were released.

Keppie, J.K., St. Julien, P., Hubert, C., Beland, J., Skidmore, B.,Fyffe, L.R., Ruitenberg, A.A., McCutcheon, S.R., Williams, H. and Bursnall, J. 1983. Times of deformation in the Canadian Appalachians. In regional trends in the geology of the Appalachian- Caledonian-Hercynian-Mauritanide Orogen, edited by P.E. Schenk. NATO ASI Series C. Mathematical and Physical Sciences, Vol. 116, pp. 307-313.

McCutcheon, S.R. 1983. Geology of the Mount Pleasant Caldera. N.B. Department of Natural Resources, Mineral Resources Division, Plate 83-164. Scale: 1:50,000.

McCutcheon, S.R. and Ruitenberg, A.A. 1983. Geology of the Eastern St. George Batholith (21 G/07E, 21 G/08W). N.B. Department of Natural Resources, Mineral Resources Division, Plate 83-9. Scale: 1:50,000.

Ruitenberg, A.A. 1983. Geology of Cape Spencer-Black River area. N.B. Department of Natural Resources, Mineral Resources Division, Plate 83-74. Scale: 1" = 1/4 mile.

_____. 1983. Geology of the Musquash Harbour area. N.B. Department of Natural Resources, Mineral Resources Division, Plate 83-75. Scale: 1" = 1/4 mile.

_____. 1983. Geology of gold-bearing rocks, Cape Spencer area. N.B. Department of Natural Resources, Mineral Resources Division, Plate 83-29. Scale: 1" = 100 feet.

Ruitenberg, A.A. 1983. Bedrock surficial and environmental geology, Town of St. Andrews. N.B. Department of Natural Resources, Mineral Resources Division. Open File Report 83-5.

Ruitenberg, A.A. and McCutcheon, S.R. 1983. Bedrock, surficial and environmental geology of North Head, Grand Manan. N.B. Department of Natural Resources, Mineral Resources Division, Open File Report 83-1.

Ruitenberg, A.A. and Fyffe, L.R. 1983. Metallic mineral zonation related to tectonic evolution of the New Brunswick Appalachians. In regional trends in the geology of the Appalachian -Caledonian -Hercynian -Mauritanide Orogen, edited by P.E. Schenk. NATO ASI Series C1. Mathematical and Physical Sciences, Vol. 116, pp. 363-373.

Thomas, R.D., Rampton, V.N., Gleason, C.F. and Ruitenberg, A.A. 1983. Heavy mineral and soil geochemistry and quaternary deposits and landforms of the Eastern St. George Batholith. N.B. Department of Natural Resources, Mineral Resources Division, MP-83-15 (Sample Location Plan); MP 83-16, MP 83-17 and MP 83-18 (respectively, heavy mineral analyses for gold, tin, and tungsten); MP 83-19, MP 83-20, MP 83-21, MP 83-22, MP 83-23, MP 83-24, MP 83-25, and MP 83-26 (respectively, soil geochemical analyses for lead, zinc, molybdenum, copper, cobalt, antimony, uranium and silver); MP 83-27 (pebble lithologies) and MP 83-28 (quaternary deposits and landforms).

Geology

Bedrock exposures and surficial deposits were surveyed by L. Fyffe and A.G. Pronk on a 1:20,000 scale in a 300 km^2 area around Trousers Lake, Victoria County (parts of 21 J/14, 21 J/15, 21 O/2, 21 O/3). In addition, till samples were collected over an area of 180 km^2 in order to study the glacial dispersion of geochemical anomalies over two known mineral occurrences located in the eastern part of the surveyed area within Devonian volcanics (Mount Costigan deposit) and granite (Long Lake deposit). Pebble lithology and mineral content of the tills were determined as an aid to Forest Site Classification.

G. Crouse and R. Irrinki mapped the bedrock geology of the 1:50,000 Sisson Branch Reservoir sheet (21 O/6) in Restigouche and Victoria Counties (Figure 10).

Figure 10. Field investigations by Mineral Resources Division geologists north of Nictau, Victoria County.

Joint patterns in a cleared exposure (30 m x 100 m), where post-glacial offsets or fractures had previously been observed, were mapped on a 1:500 scale in the epicentral area of the 1982 Miramichi earthquake to the north of Tuadook Lake (21 J/15). Three trenches were excavated across northwest-trending VLF-EM anomalies discovered by Jim Chandra to the north of the cleared exposure. Interesting glacial features and faults revealed by the trenching were mapped in cooperation with staff of Weston Geophysical of Westboro, Massachusetts. These surveys constitute part of a continuing study being conducted in the earthquake area by Atomic energy Control Board, Earth Physics Branch, and N.B. Department of Natural Resources. Future work includes the drilling of five short holes for the taking of in-situ stress measurements.

L.R. Fyffe, S.R. McCutcheon and J. Thibault have submitted a complete description of New Brunswick stratigraphic terms to G. Williams, editor for the Atlantic Region, "Lexicons of Canadian Stratigraphy" to be published by Canadian Society of Petroleum Geologists.

PUBLICATIONS

Fyffe, L.R. 1983. Joint patterns within the epicentral region of the 1982 Miramichi earthquake. N.B. Department of Natural Resources, Mineral Resources Division, Open File Report 83-13, 22 p.

_____. 1983. Bedrock geology of Trousers Lake area. N.B. Department of Natural Resources, Mineral Resources Division, Plate 84-22. Scale: 1:20,000.

Fyffe, L.R., Forbes, W.H., and Riva, J. 1983. Graptolites from the Benton area of west-central New Brunswick and their regional significance. Maritime Sediments and Atlantic Geology, vol. 19, pp. 117-125.

Irrinki, R. and Crouse, G., 1984. Geology of Sisson Branch Reservoir (21 O/6). N.B. Department of Natural Resources, Mineral Resources Division, Plate 84-32. Scale: 1:50,000.

Pronk, A. 1984. Surficial geology and related geomorphological features of the Trousers Lake area. N.B. Department of Natural Resources, Mineral Resources Division, Plate 84-23. Scale: 1:20,000.

Pronk, A. 1984. Till geochemistry of the Trousers Lake area. N.B. Department of Natural Resources, Mineral Resources Division, Plate 84-24. Scale: 1:20,000.

Pronk, A. 1984. Till geochemistry anomalies of the Trousers Lake area. N.B. Department of Natural Resources, Mineral Resources Division, Plate 84-25. Scale: 1:20,000.

Pronk, A. 1984. Till pebble lithology of the Trousers Lake area. N.B. Department of Natural Resources, Mineral Resources Division, Plate 84-26. Scale: 1:20,000.

Pronk, A. 1984. Till mineralogy of the Trousers Lake area. N.B. Department of Natural Resources, Mineral Resources Division, Plate. 84-27. Scale: 1:20,000.

Geophysics

GRAVITY SURVEYS A gravity survey was undertaken to cover the eastern flank of the Pokiok Batholith from Kings Landing to Magaguadavic Lake (Figure 9). The project was aimed at locating potential sites of Lake George-type antimony deposits.

Research work carried out by Consolidated Durham Mines and by the Geological Surveys Branch as provided much information on the relationship of the ore body to mappable structures and a buried granitic pluton. The granitic pluton was first outlined by a gravity survey and then confirmed by drilling. Also, all known structures bearing mineralization have been successfully mapped by geophysics. This project, therefore, would extend this knowledge outside the mine area to adjacent unmapped regions.

The 1983 field season provided 958 new gravity stations between Kings Landing and Magaguadavic Lake. It was estimated that an additional 500 stations are required to adequately cover some targets selected from Landsat images and airborne geophysics. These additional stations are scheduled to be completed by contract in 1985.

The data will be reported in gravity maps at a scale of 1:20,000.

MIRAMICHI EARTHQUAKE STUDIES A gravity survey of the Miramichi epicentral area was completed in 1982 with the assistance of K.B.S. Burke of the University of New Brunswick. Modelling studies of the gravity data were undertaken in 1983 by Dr. Burke and Jim Chandra and have been reported in Open File Report 83-3. Results of this gravity project indicate that the main epicentral area is underlain by Unit Df granitic rocks described by L. Fyffe (1982) in Open File Report 82-27, but bounded to the northwest and southeast by small diorite bodies (Unit Dm) in the upper part of the crust. Modelling estimates showed a probable thickness of 8 km for the overall plutonic body (North Pole Stream Granite) with a relatively thin cover of metasedimentary rocks (0-1.0 km). Because the focal depths are reported to be in the range of 1 to 7 km (Wetmiller *et al.* 1982), it is believed that the Miramichi Earthquakes are confined to the rocks of the main pluton.

In the summer of 1983, ground electromagnetic (VLF-EM and EM-31), magnetic, radiometric, and radon gas surveys were carried out in the epicentral area to complement seismic and other studies undertaken by the Earth Physics Branch (EMR) and the United States Geological Survey.

Magnetic modelling studies were begun by K.B.S. Burke and Jim Chandra.

LANDSAT IMAGE ANALYSIS Work began on using the Aries Dipex digital image analysis system to interpret Landsat images of parts of New Brunswick. Three areas, in particular, have been examined: the eastern contact zone of the Pokiok Batholith, the Mount Pleasant area and an area between Fredericton and Tracy.

CONSULTATION Consultation services were provided to various engineering, exploration and mining companies active in the area. Considerable time was spent with visiting geologists and geophysicists from other provinces and from the United States with regard to the earthquake activity in the Holmes Lake-Indian Lake area.

PUBLICATIONS

Burke, K.B.S. and Chandra, J.J. 1983. Gravity survey of the epicentral area of the main sequence of the 1982 Miramichi Earthquakes. N. B. Department of Natural Resources, Mineral Resources Division, Open File Report 83-3.

Burke, K.B.S. and Chandra, J.J. 1983. Preliminary interpretation of gravity and magnetic results from the epicentral region of the 1982 Miramichi Earthquakes. Abstract, Atlantic Geoscience Society Symposium, January 28-29, 1983, Fredericton, N.B.

Chandra, J.J. and Webb, T.C. 1983. Geophysical modelling of salt masses and basement structures in the Moncton and Cumberland Basins, N.B. Abstract, Atlantic Geoscience Symposium, January 28-29, 1983, Fredericton, N.B.

Chandra, J.J. and Webb, T.C. 1983. Basement studies in the southern Central Carboniferous Basin, New Brunswick. Abstract, Atlantic Geoscience Society Symposium, January 28-29, 1983, Fredericton, N.B.

Chandra, J.J. 1983. The 1982 Miramichi Earthquakes. Canadian Institute of Mining and Metallurgy, 14th Technical Session, September, 1983, Bathurst, N.B.

Geochemistry

In 1982, a total of 3,547 stream silt samples were collected from map sheets 21 O/3W (Riley Brook) and 21 O/6 (Sisson) by Water Management Services under contract to the Mineral Resources Division.

Stream sediment samples were collected in paper packets to facilitate air drying in a specially designed, electrically heated (heat lamps) wooden cabinet. After drying, the samples were sifted to obtain the minus 80 mesh (170 u) portions for analyses.

Three methods were used to analyze samples:

1. Atomic Absorption.
2. Colorimetry
3. Neutron Activation

The atomic absorption method was used to analyze for 8 elements: Cu, Pb, Zn, Mo, Fe, Ag, Co and Ni.

Samples of 1 g were digested with hot nitric acid and the clear liquid introduced as an aerosol into an air-acetylene flame of the Perkin Elmer Atomic Absorption Instrument (Model 503). The measured absorbance for each element was compared to prepared standards and the element content determined in parts per million as described in the Perkin Elmer Atomic Absorption Model 503 manuals (1976).

The colorimetric method was used in the analysis for molybdenum and tungsten.

Samples of 0.25 g for molybdenum and 0.50 g for tungsten were fused with potassium hydrogen sulphide and leached with hydrochloric acid. A color complex of each sample was then prepared for visual comparison with prepared standards as described in Stanton (1976).

Uranium analyses were done by the method of Neutron Activation (Delayed Neutron Counting), at the Atomic Energy of Canada Limited Commercial Products Division in Ottawa. When a sample containing uranium is bombarded with a neutron flux in a reactor facility, fission of the uranium occurs. Some of the fission-product nuclides emit delayed neutrons. The number of delayed neutrons emitted is a linear function of the amount of uranium present in the sample. Because the delayed neutrons can be detected and selectively counted, the total amount of uranium present in the sample can be readily determined by comparison to a standard reference material containing a known level of uranium (A.E.C.L. 1978).

A computer program consisting of two statistical packages of the data were prepared. They were termed Statistics I and Statistics II, respectively. Statistics I package calculates mean, medium, mode, maximum, minimum range, variance and standard deviation for each element. The data set was also divided into count cells and a frequency distribution plot was created. A line plot can also be drawn showing maximum, minimum, mean, median, mode, standard deviation and quartiles.

The Statistics II package compares the elemental values of organic samples versus inorganic samples. Similar comparisons can be made using the rock type and age codes in the data list. In the Statistics II package, the following parameters can be calculated for each data set: mean, standard deviation, maximum and minimum. The frequency distribution of each group of data can also be determined and plotted.

The Statistics I and II computer programs are taken from BMDP Biomedical Computer Programs P-Series (1979) in which they are identified as BMDP2 and BMDP3, respectively.

The analytical will be published as a series of 1:20,000 map plates (Figure 11).

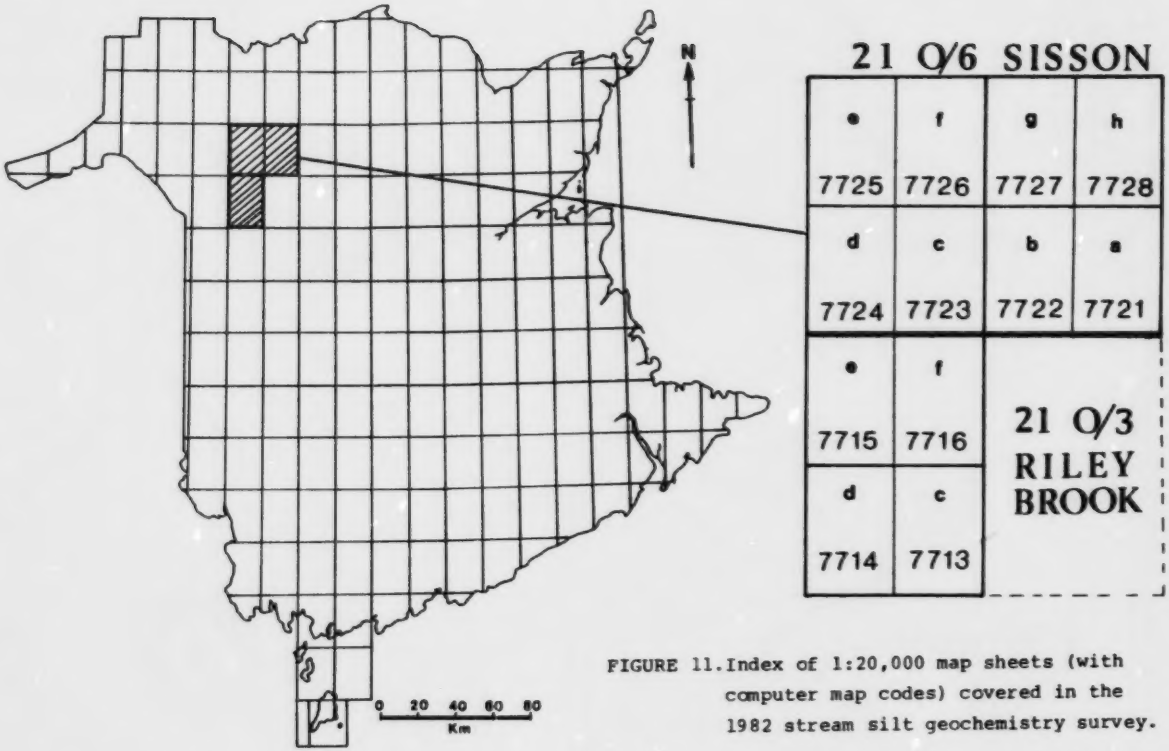

FIGURE 11. Index of 1:20,000 map sheets (with computer map codes) covered in the 1982 stream silt geochemistry survey.

Information Services Centre

The Information Services Centre is part of the Geological Surveys Branch and consists of the following people:

D.J.J. Carroll.....Co-ordinator
L.G. Johnson.....Drafting section
R.E. Phillips.....Drafting section
S.A. Burns.....Publication section
C.M. LeBlanc.....Assessment file - Microfiche section

Some of the major activities carried out during 1983 are summarized below:

CO-ORDINATION OF PROSPECTING COURSES Due to an increase in demand for the continuation of the Department's prospecting course, the Mineral Resources Division offered the 10-session course in three locations: Woodstock, St. Andrews and Boiestown.

The total enrollment at these centres was 35, which brought the overall number of prospecting course registrants to 196 since its inception in January of 1981.

In order to give the course participants some practical experience, a one-day field trip to several gold occurrences in the southern part of the province was conducted by Dr. A.A. Ruitenberg, regional geologist for that area (Figure 12).

MICROFILMING OF EXPLORATION ASSESSMENT REPORTS The Mineral Resources Division also continued to microfilm all incoming mineral exploration assessment data files and provide duplicate microfiche to several libraries in the province as well as the two regional offices of the Geological Surveys Branch.

Duplicate copies of assessment file microfiche may be purchased from Precision Microfilming Services, 6061 Young Street, Halifax, N.S. B3K 2A3.

INDEXING OF ASSESSMENT FILE REPORTS The indexing and coding of all incoming mineral exploration assessment data reports for inclusion in the national bibliographic data file called GEOSCAN was continued. This data base, which is managed by the Geological Survey of Canada, offered for the first time in 1983, on-line data entry to GEOSCAN. As a result of this, the Mineral Resources Division was able to completely update its data in this file.

In order to provide the users of our data with aids to procure the information they are seeking, a special custom GEOSCAN index sorted by NTS was produced. This index was distributed at the 1983 Mineral Resources Division Review of Activities.

AUDIO-VISUAL PRODUCT LOANS During the past year, several requests were received for the loan of audio-visual products that promoted, publicized, and/or demonstrated some aspect of our province's geological and mineral resource history. Brunswick Mining and Smelting Corporation Limited, for example, borrowed the Department's large panel display for exhibition purpose in the northern part of New Brunswick. In addition, several schools in New Brunswick, Nova Scotia and the State of Maine, borrowed the movie "The Awakening Giant" and slide presentation "Peat Industry of New Brunswick".

Figure 12. Field trip for students of the prospecting course given by the Division. The Cape Spencer and Musquash areas were visited.

PUBLIC AWARENESS PROGRAMS In 1983 the Mineral Resources Division also participated in two public events that required the production of new exhibition displays.

In March, as a result of an invitation by the Prospectors and Developers Association, the Mineral Resources Division participated in a provincial display at their convention in Toronto.

The exhibit produced for this convention consisted of a pictorial display which identified New Brunswick's various mineral producers and mineral deposits; all centered around the theme "In New Brunswick You'll Find It...".

At the request of the Newcastle Careers Day organizing committee, the Mineral Resources Division produced an exhibit that graphically and pictorially displayed the involvement of staff in the gathering of geoscientific data and management of our provincial resources. This display was attended by Dr. J.L. Davies, regional geologist for northern New Brunswick.

In response to requests for up-to-date photography of major mineral properties and mineral resources related subjects, aerial photographs of several industries in the southern part of New Brunswick were obtained.

Since the Information Services Centre is the focal point for obtaining geoscientific data, several hundred public requests were handled in 1983. Total revenue from the sale of maps, reports, and facsimile publications amounted to slightly over $21,000.00.

MINERAL DEVELOPMENT BRANCH

The Mineral Development Branch is composed of the Director's office and three sections, Energy Resources, Industrial Minerals and the Mining Engineer. The director was R.W. Warren.

The Mineral Development Branch's overall goals are to ensure that mineral deposits are developed at the optimum rate consistent with long-term income and employment objectives, to enhance the viability of marginally economic mineral deposits, to ensure that inactive mining operations are rehabilitated to a state which would avoid on-going costs to the public and, where possible can be economically productive in other uses, to ensure the highest degree of in-province processing and to maximize recovery both in the mining and primary processing stages (Figure 13).

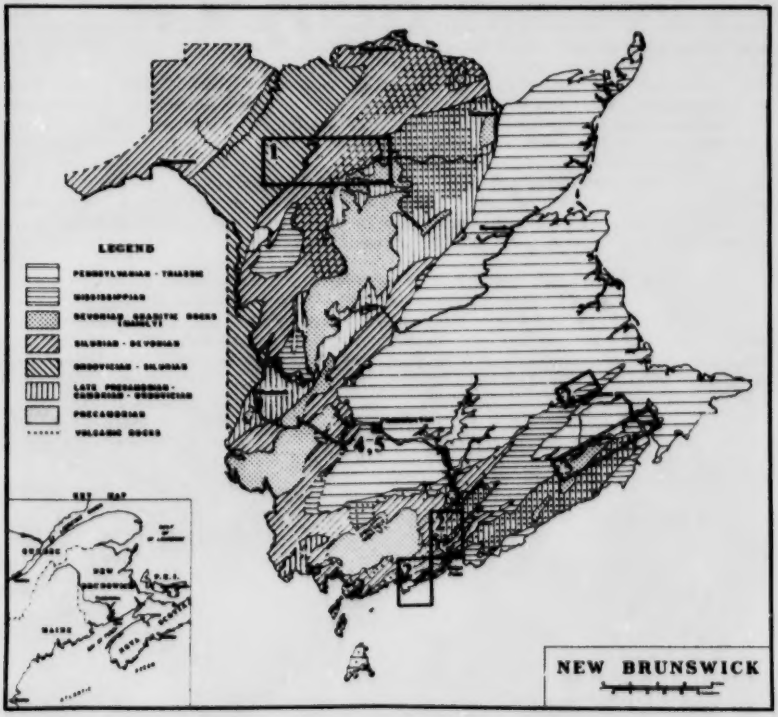

Figure 13. Areas in which Mineral Development Branch projects were carried out in 1983

1 Granular Aggregate Resources. Sisson and Nepisiguit Lakes

2 Limestone studies, Havelock and Saint John areas

3 Albert Oil Shale

4 Compilation of peatlands inventory

5 Coal - Oil Shale combustion research

Energy Resources

The staff of Energy Resources included Donald Gemmell, Energy Resource Geologist, Clinton St. Peter, Geologist, Ron Shaw, Geologist and Tom Martel, Geologist.

OIL SHALES The Branch continued its economic field evaluation of the Albert oil shales. Several sites have been outlined where high-grade oil shale beds are exposed.

Petro-Canada in 1983 dropped its oil shale licence to search 28,776 hectares in the Dover area, after drilling 3 holes totalling 964 m.

The New Brunswick Research and Productivity Council (RPC), under contract to the Department during 1983, has conducted oil shale research and found that New Brunswick oil shales have excellent retorting characteristics, that hydrogen retorting increases yields of shale oil by up to 59 per cent, and that the shale oil is "light" and of high quality.

The research at RPC has resulted in the New Brunswick Electric Power Commission (NBEPC) and the Federal Government signing an agreement to retrofit the NBEPC Chatham plant to a 20 megawatt circulating fluidized-bed combustor. The Chatham study will also determine the feasibility of installing a low nitrous and sulphur oxide burner at the plant.

PEAT Maps and profiles for peatlands surveyed under the Peatlands Inventory Project were completed. A report entitled "Detailed Guide to Computerized Peatland Data Files" were prepared as an operators manual. Final reports were being drafted at year's end.

There continued to be requests for peatland exploration licences as well as conversion from licence to lease. The majority of requests related to the horticultural peat; however, one company expressed interest in acquiring a bog with the intent of using fuel- grade peat to offset energy costs.

COAL Adherence to the Provincial Coal Policy continued in 1983. Under this policy the exploration tracts with surmised coal potential are offered on a regular basis with the New Brunswick Electric Power Commission having a 60-day right of first refusal. Under this policy, Block No. 1 comprising 15,093 ha was optioned by New Brunswick Electric Power Commission and reduced to 2,940 ha in 1983 following the 1982 exploration program.

A second block, No. 2, comprising 13,274 ha, was picked up by New Brunswick Electric Power Commission but later dropped during 1983.

Representation continued on a number of task forces and working groups involved with coal beneficiation and utilization.

PIPELINE AND UNDERGROUND STORAGE Review of the proposed Denison-Potacan Potash Company's 34 km brine pipeline, from the mine site at Clover Hill to the Bay of Fundy at St. Martins, took place in 1983. Preliminary approval is anticipated in early 1984 although the brine outfall end requiring Federal Government approval will take longer to process.

OIL AND NATURAL GAS Monitoring of the Stoney Creek Field and the continued seismic program by Chevron-Irving continued in 1983. Other minor studies relating to the potential for oil and natural gas in the Province were also conducted.

INDUSTRIAL MINERALS

The Industrial Minerals staff consisted of Donald E. Barnett, Industrial Minerals Geologist; Tim C. Webb, Jacques J. Thibault, and Allen A. Seaman, Geologists; and Paul C. O'Leary, Engineering Technician. Three summer assistants were employed for the duration of the field season.

AGGREGATE RESOURCE INVENTORY The program of granular aggregate resource mapping and evaluation continued in 1983. Mapping was carried out on NTS map sheets 21 O/6 (Sisson) and 21 O/7 (Nepisiguit Lake) at a scale of 1:50,000 (Figure 14).

QUATERNARY GEOLOGY Work continued on the compilation of the Quaternary geology originally started in 1981. The work is being carried out by Dr. Vern Rampton of Terrain Analysis and Mapping Services Limited and is being funded in 1983 by the Geological Survey of Canada.

The study involves the compilation of all published surficial geological data as well as field visits to "marry" the various authors' geological units. The results will be published in a G.S.C. Memoir, together with a map at a scale of 1:500,000. Both the report and map will be available by May 1984.

POTASH Programs continued for the monitoring of potash developments at Potash Company of America (Plumweseep), Denison-Potacan Potash Company (Salt Springs) and BP Exploration Canada Limited (Millstream). Included in this work was the monitoring of two drill holes completed by BP in 1983.

LIMESTONE Evaluation of limestone resources in the Havelock basin was completed. This work, contained in an internal report, involved a detailed analysis of the geology, reserves and land ownership affecting future limestone extraction. All drill hole data, geology, land ownership and mineral rights are compiled at a 1:10,000 scale.

CROWN AGGREGATE MANAGEMENT Management of aggregates on Crown lands continued under the Quarriable Substances Act.

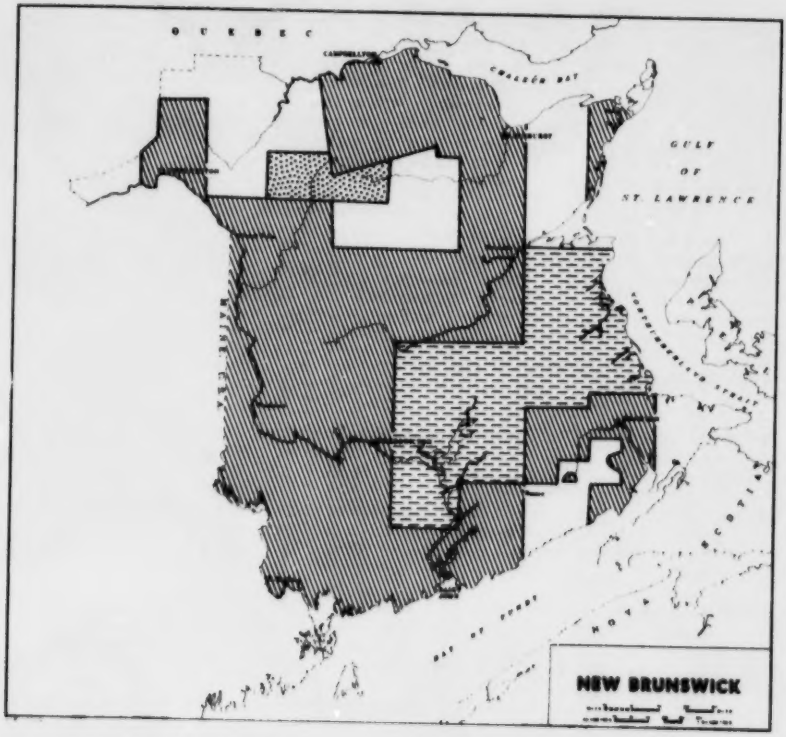

Figure 14. Aggregate resource industry in New Brunswick, 1983

Area mapped pre-1983

Mapping in 1983

Proposed mapping in 1984

A total of 277 quarry permits were issued during the year, representing an increase of 29 per cent over the previous year. Quarry leases in effect in 1983 included those to Dundee Cement Products Limited, Brunswick Mining and Smelting Corporation Limited, Elmtree Resources Limited and Brunswick Ready Mix Concrete Limited, covering a total area of 439 hectares. Inspections were made throughout the year to ensure that regulations under each quarry permit and lease were adhered to. A total of 1.22 million tonnes of sand and gravel were removed from Crown lands in 1983 with a royalty value of $210,300.

A representative continued to sit on the Land Management Advisory Committee providing information for the orderly development and management of Crown lands. Numerous reports on the aggregate potential of lands involved in Crown land exchanges were prepared throughout the year.

PUBLICATIONS

Seaman, A.A. 1983. Granular aggregare resources of Blackville (21 I/12). N.B. Department of Natural Resources, Mineral Resources Division, Open File Report 83-12.

Seaman, A.A. 1983. The Late Quaternary history of Burtts Corner area (21 J/12) New Brunswick. N.B. Department of Natural Resources, Mineral Resources Division, Open File Report 83-2.

Thibault, J. 1983. Surficial deposits of parts of Fredericton Junction (21 G/10) and McDougall Lake (21 G/7). N.B. Department of Natural Resources, Mineral Resources Division, Open File Report 83-14.

Thibault, J. 1983. Granular aggregate resources of McDougall Lake (21 G/7). N.B. Department of Natural Resources, Mineral Resources Division, Open File Report 83-6.

Reclamation

An interdepartmental committee, consisting of members from the Departments of Agriculture, Environment and Natural Resources completed a report "Strategy for the Reclamation of the Disturbed Lands in the Minto-Chipman Coal Mining Region" for the Deputy Ministers in mid-year. From this report reclamation parameters were drafted for the N.B. Coal Limited reclamation program as well as the terms of reference for a proposed inventory survey of the pre-1977 disturbed lands in the area.

Several reclamation plans were received in 1983 and these were reviewed by the three departments named above. In 1983 more emphasis has been placed on contouring and ground cover in the reclamation plans (Figure 15).

MINING COMMISSIONER'S REPORT

Rights to minerals in New Brunswick are allocated in accordance with the provisions set out in the Mining Act, which is administrated by the Minister of Natural Resources. Where and when conflicts arise, these matters are determined by the Mining Commissioner who is appointed by the Lieutenant-Governor in Coucil.

The Mining Commissioner has exclusive jurisdiction to hear and resolve any question, dispute, matter or claim arising out of the application of the Mining Act and those provisions of the regulations pertaining specifically to the Act.

The Mining Commissioner heard and decided the following cases during the 1983 calendar year:

1. Hunter vs. Gordex Minerals Limited - land damage to private property due to a mining operation.

2. McFarlane vs. Billiton Canada Limited - alleged land damage resulting from a mining operation.

3. Wilson vs. Brunswick Mining and Smelting Corporation Limited - claim staking dispute.

4. Chevron Standard Limited vs. Samuel Beck - application for a "Special order" pursuant to Section 10 of the Oil and Natural Gas Act.

5. Chevron Standard Limited vs. Lane, Fred and Susan Waddy - application for a "Special Order" pursuant to Section 10 of the Oil and Natural Gas Act.

6. Pitre vs. Western Energy Resources Limited and Archibauld vs. Western Energy Resources Limited - claim staking dispute.

In conclusion two claim staking disputes - Brunswick Mining and Smelting Corporation Limited vs. Billiton Canada Limited and Wilson vs. Brunswick Mining and Smelting Corporation Limited were on hand pending resolution at year-end 1983.

Figure 15. Coal dump reclamation project in the Wildcat Brook area, near Minto.

CHAPTER 3. METALLIC MINERALS

PRODUCING MINES

Metals were produced from four mines in New Brunswick in 1983, two of these mines Brunswick No. 12 and No. 6 are owned by Brunswick Mining and Smelting Corporation Limited, the other two by Heath Steele Mines Limited and Anaconda Canada Limited.

BRUNSWICK MINING AND SMELTING CORPORATION LIMITED

Brunswick operates two mines, No. 6 and No. 12, a concentrator and a lead smelter.

LOCATION The Brunswick No. 12 mine is located about 15 miles west of Bathurst in Gloucester County (Lat. 47°28.5'N and Long. 65°53.5'W). The Brunswick No. 6 mine is located about 29 km southwest of Bathurst and about 10 km south of No. 12 (Lat. 47°24.3'N and Long. 65°49.5'W). The concentrator that treats ore from both mines is adjacent to No. 12 mine. The lead smelter is located at Belledune Point, about 45 km in a direct line from No. 12 mine.

HISTORY The presence of sulphides was noted in 1907. Drilling of electromagnetic targets in 1952 located the No. 6 mine. Investigation of other electromagnetic targets on strike pinpointed a target for drilling at the site of No. 12 mine in 1953. The property was granted to Brunswick Mining and Smelting which was controlled by St. Joseph's Lead Company. During the period 1953-57 an open pit and pilot mill were constructed at the No. 6 location. In 1961, interest transferred to M.J. Boylen, K.C. Irving and Patino Corporation. Development commenced at No. 12 in 1962 and the mine commenced production in 1964. Production was reached at No. 6 mine in 1966. In 1967, Noranda invested $50 million and gained control. A proposed $50 million expansion, undertaken in 1974, was completed in 1981. Between 1979 to 1981 nearly $69 million in capital expenditures were made at the mine and smelter.

COMPANY Head Office - P.O. Box 45, Commerce Court W., Toronto; Mine Office - P.O. Box 3000, Bathurst; Smelter Office - P.O. Box 2000, Belledune. Officers - President - J.A. Hall; Vice President, Mining - J.W. Moerman; Vice President, Smelting - A. Young.

EMPLOYEES Mine employees number 1,723 and smelter employees number 602.

PRODUCTION

Ore	Tonnes	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
No. 12 Mine	3,295,842	0.3	3.56	9.00	99
No. 6 Mine	147,128	0.52	2.57	6.90	86
Anaconda Caribou	28,157	0.33	2.16	5.86	65
Total Mill Feed	3,471,127	0.3	3.42	8.67	97
Concentrate					
Copper	22,148	21.65	8.67	3.49	3083
Lead	204,494	0.69	33.46	6.10	508
Zinc	419,481	0.27	2.02	51.82	91
Bulk	80,007	0.65	15.06	35.39	292
Pyrite	1,151	0.65	2.50	18.14	139
Tailings	2,711,578	0.10	1.08	1.71	37
Smelter (metal)					
Lead (tonnes)	58,000				
Silver (Kg)	113,400				
Sulphuric acid (tonnes)	179,000				

RESERVES (December 1983)

	Tonnes	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
Proven ore	71,127,000	0.29	3.67	9.04	97
Probable ore	31,918,000	0.36	3.70	8.94	98

DEVELOPMENTS Production in 1983 was down approximately 220,000 tonnes from 1982. Net earnings were down from $16.5 million in 1982 to $7.6 million in 1983, primarily due to an after-tax write-down in value of the preliminary work done on the proposed electrolytic zinc plant at Belledune. The company has abandoned plans for this facility for the foreseeable future. Production from the No. 6 mine has ceased.

HEATH STEELE MINES LIMITED

LOCATION The Heath Steele Mine is located 51 km northeast of Newcastle in Northumberland County (Lat. 47°17'N and Long. 66°05'W.)

HISTORY The deposit was discovered in 1954 by airborne E.M. Mining began in 1957 but shut down between 1958 and 1962 because of low metal prices and poor recoveries. The mine reopened in 1962 with a contract to treat the Wedge ore in part of the concentrator. Production capacity was increased from 1,451 to 2,721 tonnes/day in 1970 and to 3,629 tonnes/day in 1977. The new production shaft (No. 5) was completed to a depth of 888 m in 1976.

COMPANY Heath Steele Mines Limited is owned by Noranda Mines (75%) and Asarco (25%). President is R.C. Ashenhurst. Mine Manager is Jim Johnstone.

PRODUCTION Concentrator capacity is 3,629 tonnes/day. 1983 results are as follows:

	Tonnes	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)	Au (g/t)
Mine Gossan	450,560	0.97	1.50	3.71	53	-
	52,257				105	61
Concentrates						
Lead	15,509	2.57	22.93	3.83	521	-
Zinc	27,499	0.95	1.72	48.29	105	-
Copper	14,816	18.61	7.91	4.92	368	-
Tailings	392,727	0.27	0.51	0.71	22	-

Cyanide leaching of gossan ore produced 6.5 tonnes of precipitate containing 175,392.6 g gold and 2,505,262.5 g silver; 4.88 tonnes was shipped to three refineries.

RESERVES (December 1983)

	Tonnes	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
Indicated	22,904,000	1.24	1.42	4.26	59.31
Inferred	1,927,000	1.30	1.36	4.11	62.40

DEVELOPMENTS, 1983 The mine closed on April 30, 1983 due to low metal prices and diminished revenues. A plan submitted in early 1984 called for a small open pit operation in the E zone, that would re-employ 150 workers. Exploration in the main ore body (B zone) continued

PROPERITIES IN DEVELOPMENT STAGE

CARIBOU DEPOSIT (Anaconda)

LOCATION The Caribou deposit is approximately 40 km west of Bathurst (Lat. 47°34'N; Long. 66°17.6'W) in Restigouche County.

HISTORY The mineralization was discovered in late 1955 by Anaconda Copper Mining Company through regional geological mapping using aeromagnetic maps and photo interpretation. Ground EM pinpointed the drill target. Mining of secondary (near surface) copper took place between November, 1970 and November, 1971. Metallurgical problems caused shutdown. Production resumed in September, 1973 and continued for one year. Extractive metallurgy research on Pb, Zn, Cu ore continuing.

COMPANY Caribou-Chaleur Bay Mines Limited, 260 8th Street, Toronto, Ontario, M8V 3E1). President - R.L. Sinclair. Mine Manager and Vice President - A. Buzas (resigned). Anaconda Canada Limited 67.5%, Cominco Limited 22.5%, Chaleur Bay Syndicate 10.0%, Caribou-Smith M.L. (east part of sulphide body), controlled by Anaconda Canada Limited.

PROPERTY AND DEVELOPMENT The property is held under a mining licence. Anaconda excavated an adit in the late fifties, and in late sixties and early seventies an incline was driven from the adit. Coincidentally a 907 tonne/day mill with a copper concentrator was constructed.

PRODUCTION Secondary copper ore was produced.

	Tonnes	Cu (%) Av. grade
Open Pit (Nov. 1970 - Sept. 1974)	825,552	3.4

FINANCIAL Caribou-Chaleur and Caribou Smith each issued 3000 million shares.

RESERVES -

Tonnes	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
44,815,680	0.47	1.7	4.48	53.4

(probably a smaller tonnage with higher grade (22,675,000 tonnes).

DEVELOPMENTS, 1983 Heap leaching of gossan was completed. Gold and silver extracted in 1983 amounted to 88,582.77 g and 1,688,018 g, respectively. Kennco agreed to let Anaconda sample gossan available at Bathurst Regional Office. However, Anaconda has sold its gold refining equipment.

CHESTER MINE

LOCATION The Chester deposit is approximately 72 km west of Newcastle in Northumberland County (Lat. 47°06'N; Long. 66°13.9'W). It is accessible via Highway 430 and secondary roads.

HISTORY Mineralization was discovered by Kennco Canada Exploration in 1955 and the property was sold to Chesterville Mines Limited in the early sixties. It was acquired by the Sullivan Group in the late sixties.

COMPANY Chester Mines Limited (100% owned by the Sullivan Mining Group Limited); 2500 - 500 Place d'Armes, Montreal, Quebec, H2Y 2W6. President - J.J. Beauchemin.

PROPERTY AND DEVELOPMENT The property is held under mining licence (2,177 ha); 42,062 m of diamond drilling was carried out and a decline exceeding 366 m was constructed in 1975. Water treatment plant construction begun in 1974.

RESERVES AND GRADE

	Type	Tonnes x 10^6	Cu (%)	Pb (%)	Zn (%)
Open Pit	probable	1.45	0.63	0.83	2.12
	probable	2.99	0.82		
Underground	probable	3.45	1.58		
	probable	8.34	0.44		

DEVELOPMENTS, 1983 Although there is nothing to report on the owner's activity, Noranda have been active on an 1100 claim property to the north of Chester and have discovered two sulphide showings.

LAKE GEORGE ANTIMONY

LOCATION The Lake George antimony mine is situated about 14.5 km north of Harvey Station, York County.

HISTORY Antimony sulphide was first discovered on the property in 1863. There was minor production between 1880 and 1884. The first major development that led to production occurred in 1969-71.

COMPANY Consolidated Durham Mines and Resources. V.N. Harbinson is president and Bertin Bourgoin is mine manager.

PROPERTY AND DEVELOPMENT Detailed drilling has been mainly concentrated around the present mine workings. An inclined shaft provides access to the mined out ore zone, but it requires deepening to reach the new ore zone.

EMPLOYEES The company has reduced staff to key employees.

PRODUCTION

	Tonnes mined short	Average grade %	Concentrate produced - tonnes	Avg. % of Antimony in Concentrate	Kg of Antimony Concentrate
1974	49,997	5.23	3,733	65.67	2,451,502
1975	76,046	3.95	3,463	66.13	2,290,120
1976	81,893	4.34	4,361	65.97	2,876,999
1977	91,428	3.85	3,896	65.94	2,569,065
1978	93,964	3.50	3,880	65.58	2,544,546
1979	100,168	3.58	4,337	65.67	2,848,155
1980	90,294	3.09	3,463	66.86	2,315,400
1981	35,762	3.54	2,480	66.37	1,646,003

FINANCIAL In June, 1983, the company had working capital of $3,932,491.

RESERVES AND GRADE June 1983: 774,000 tonnes averaging 4.15% antimony (1.5% cut-off); 548,389 tonnes averaging 5.17% antimony (2.0% cut-off).

DEVELOPMENTS, 1983 Underground equipment was reconditioned and maintenance work was carried out in the mill.

Prior to closing the mine, an antimony ore zone was found in the downward extension of the Hibbard vein, between the 244 m (800 ft) and 427 m (1,400 ft.) levels. This zone contains 774,000 tonnes of ore grading 4.15% Sb, using a 1.5% cut-off grade. In addition, low-grade tungsten minerals and gold were intersected in several drill holes.

MOUNT PLEASANT TUNGSTEN DEPOSIT

LOCATION The Mount Pleasant deposit is situated about 50 km northeast of St. Stephen, Charlotte County.

HISTORY A group called Geochemical Associates staked Mount Pleasant in 1954 for Sellco Exploration Limited. Sellco drilled four holes in a geochemical anomaly, but no metallic minerals of interest were intersected and the property was returned to Geochemical Associates. In 1956, Kennco Exploration (Canada) Limited optioned the property and drilled ten holes, but the results were disappointing and Kennco dropped the option. Mount Pleasant Mines Limited staked the ground in 1959. Kennco optioned the property again and drilled several holes that intersected tungsten, molybdenum and tin minerals, but the option was dropped again, because the mineralized zone could not be followed. In 1960, a trenching and diamond drilling program combined with a detailed geological investigation by the Mount Pleasant Mines geological staff led to the discovery of a tin-base metal ore zone in the northern part of the property. Deep drill holes also intersected tungsten-molybdenum ores in the northern part of the property and in the Fire Tower Zone, but lack of sufficient funds prevented systematic drilling of these deeper ore zones. The delineation of the complex geology of the property guided subsequent exploration by Sullico Mines Limited. This company optioned the property in 1967. Drilling by Sullico and later its wholly-owned subsidiary Brunswick Tin Mines Limited led to the delineation of the tungsten-molybdenum ore zones in the Fire Tower zone and in the northern part of the property. In 1977, Billiton Canada Limited and Brunswick Tin Mines Limited made a joint venture agreement to bring the property into production. Mill construction (Figure 16) and underground work in preparation for production were completed in 1983, when the first commercial concentrates were produced.

Figure 16. Mount Pleasant mine site, Charlotte County

COMPANY Billiton Canada Limited, Head Office - 2802, 130 Adelaide Street West, Toronto, Ontario M5H 3P5. The President is W.P.F.H. de Graaff, and the Mine Manager is H.E. Pawson.

EMPLOYEES 235.

RESERVES (December 31, 1983). Reserves are estimated to be 12,220,000 tonnes grading .38% WO_3 and .20% MoS_2 in the Fire Tower Zone. Additional reserves are indicated in the Fire Tower Zone and northern part of the property.

DEVELOPMENTS, 1983 Mill construction was completed and stopes were prepared for production. The first commercial tungsten concentrates were produced. The company also continued an active exploration program for tin and tungsten in the southern and central part of the province.

EXPLORATION ACTIVITY IN NORTHERN NEW BRUNSWICK

Mineral exploration was reduced from the level attained in 1982 although there appeared to be a slight upturn later in the year. The search for Zn-Pb-Ag massive sulphides continued, but there was growing interest in gold deposits, particularly in view of the Hemlo-type occurrences that may have counterparts in the Tetagouche volcanic pile. A large proportion of the exploration work was carried out by Noranda interests, viz. Brunswick Mining and Smelting Corporation Limited, Noranda Exploration and Mattagami Lake Exploration. Other companies active in the region or reporting assessment work include Kidd Creek Mines, Riocanex, Cominco Limited, Anaconda Canada Exploration Limited, B.P. Minerals, Amax Minerals Exploration, Esso Minerals Canada Limited, Elmtree Resources Limited, Amoco Canada Petroleum Limited, Canadian Nickel Company, Minerais Lac Ltée, Granges, Placer Development, Miramichi Lumber Company and Chaleur Silica. Individuals reporting work in the area include Norman Pitre, Ken Whaley and Orville O'Connell. (Figure 17).

The highlights of the 1983 campaign are:

1. The discovery of a new massive Zn-Pb-Ag sulphide deposit by BP Minerals on their West Wedge property optioned from Northeast Exploration Services Limited. Details of the drill hole intersection have not been announced.

2. Brunswick Mining and Smelting are continuing to obtain encouraging results from their Flat Landing Brook deposit. Thick, but low grade, massive sulphides have been intersected at depth, but the company has not officially reported the results.

COMPANIES AND INDIVIDUALS
PROPERTIES EXPLORED 1983
(to accompany Figure 17)

1. Brunswick Mining and Smelting Corp.
2. Mattagami Lake Exploration Ltd.
3. Billiton Canada Ltd.
4. Kidd Creek Mines Ltd.
5. Canadian Nickel Company Ltd.
6. Riocanex Inc.
7. B.P. Minerals
8. Cominco Ltd.
9. Orville O'Connell
10. Esso Minerals Canada Ltd.

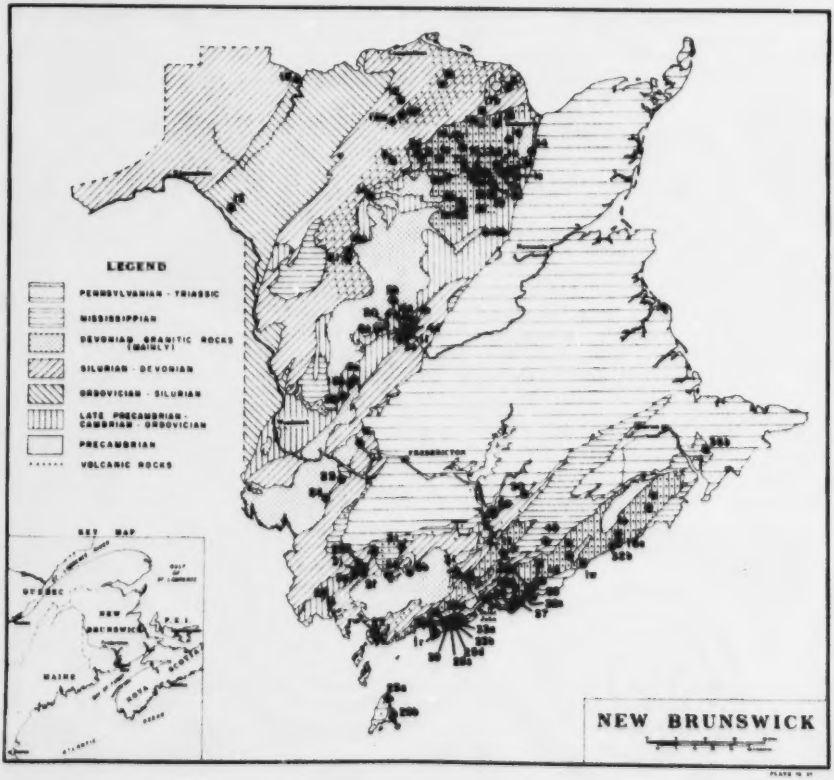

Figure 17. Properties explored in New Brunswick in 1983

11. Shell Canada Resources
12. Amax Minerals Exploration
13. St. Leonard Iron Mines
14. Chaleur Silica Ltd.
15. Anaconda Canada Exploration Ltd.
16. K.D.A. Whaley
17. Elmtree Resources Ltd.
18. Amoco Canada Petroleum Ltd.
19. Norman Pitre
20. Miramichi Lumber Co.
21. Lac Minerals Ltd.
22. J.J. Dolan
23. Durham Resources Inc.
24. Dallas Davis
25. Gleason-Rampton Expl.
26. Appalachian Resources Inc.
27. Highbourne Exploration Ltd.
28. Acadia Mineral Ventures
29. Maritime Resources Research Ltd.
30. M.J. Grant and W.G. Walton
31. Uranerz Exploration and Mining Ltd.
32. Rex Silver Mines Ltd.
33. P. Fenety - P. Burke
34. Gordex Minerals Ltd.
35. H.C. McNamara
36. Cuvier Mines Ltd.
37. Bakertalc Inc.
38. J. Newhouse
39. Goldfluor Explorations Inc.
40. A.W. Lockhart

3. The interesting work on the Mount Costigan Zn-Pb-Ag prospect by Minerais Lac Limitée who have optioned the property from Amoco Canada Petroleum. Although Minerais has not released the results of their 1983 drilling program, Amoco's drilling and trenching has outlined significant sections of Zn and Pb (+Ag) in what appears to be a hydrothermally altered Devonian breccia-pipe.

On the negative side Billiton Canada Limited, despite very large expenditures over the last few years, has dropped their interest in the Half Mile Lake (Kidd Creek Mines - Baie Copper Mines) Zn-Pb-Cu deposit. Their work substantially increased the geological reserves of this deposit. Billiton also decided not to continue with their option on the Restigouche sulphide deposit.

MIRAMICHI ZONE

(1) **Brunswick Mining and Smelting Corporation Limited**

(b) Upsalquitch Lake Project 440-770 21 O/8W, O/7E

This 48 claim group was staked on the basis of a 1980 N.B. Mineral Resources Division silt survey, and inadequately explained soil base metal anomalies outlined in the fifties and sixties by Leitch Gold Mines and Noranda Exploration. The work reported consists of geological, soil and stream silt geochemical, gravity and Max-Min EM surveys. The claims lie on the northwestern limb of an overturned (south) synclinorium involving highly deformed metasedimentary rocks of the Tetagouche Group. Float containing galena and sphalerite was found in a few places, one assayed 0.42% Pb and 1.8% Zn. Gossanous soils and iron-rich springs on the west side of Upsalquitch Lake are due to disseminated sulphides outlined in previous drilling.

The soil survey outlined a Zn-Pb-Ag anomaly at the northern end of Upsalquitch Lake. However, the results of the stream silt survey are generally negative except for anomalous Zn in streams draining the southwest of the property.

The Max-Min survey outlined good conductors over graphitic sedimentary rocks and chloritic-schists that host disseminated pyrite and pyrrhotite. The gravity results, though incomplete, indicated several anomalies coincident with conductors and magnetic trends.

(c) Gilmour Brook Project 116 21 P/5W

The Gilmour Brook property, comprising 46 claims, has been investigated sporadically for thirty years. However, only minor mineralization associated with iron formation has been found.

Brunswick Mining and Smelting reported soil geochemical, geological, magnetometer, gravity and Max-Min surveys in 1982. Three Zn-Pb-Ag-Cu soil anomalies were outlined. The best is associated with sulphide mineralization found by previous drilling (New Jersey Zinc, 1954-59). Weaker anomalies are associated with felsic volcanic gabbro contacts. Gravity anomalies are mainly due to gabbro, but, one over quartz feldspar porphyry is thought to be worthy of further work. Three significant EM conductors were outlined. The two strongest are formational and due to graphitic sedimentary rocks. The magnetometer survey traced the narrow iron formation with which the sulphide mineralization is associated.

(d) A'Hearn Extension 21 O/8E

This property surrounds the A'Hearn Zn-Pb-Ag sulphide showing found in 1969 by Findathoran Syndicate. A geological survey of the claims indicates generally south-trending formations of felsic lapilli, crystal tuffs and metasedimentary rocks, including hematitic and graphitic types and minor basaltic tuff. Gabbro intrusions are apparently ubiquitous. Schistosity and layering trend south and dip east, whereas crenulation cleavage (S_2) strikes west and dips steeply south.

(e) Devils Elbow M.L. 1317 21 O/8W

The Devils Elbow sulphide deposit (362,880 tonnes, 1.2% Cu) was found in 1956-57 by American Metals Company Limited as a result of an airborne EM survey. Since then several companies have unsuccessfully attempted to increase its size.

Conwest Exploration Company Limited staked the property in 1977, and optioned it to Brunswick Mining and Smelting in 1979. The sulphides are hosted by blue quartz eye chlorite-sericite schist intercalated with chloritic tuffs, metasedimentary rocks and chert. The rock sequence is part of a thicker felsic crystal tuff that traces an arc convex to the southwest. Complex polyphase deformation has produced three strong cleavages. Work reported by Brunswick Mining and Smelting comprises geological, geochemical (soil and rock), Max-Min II, magnetometer and gravity surveys.

The soil survey revealed several Pb, Zn, Cu and Ag anomalies, despite a scarification process carried out for forestry purposes. One hundred and twenty-seven drill core samples were analyzed for major elements in an attempt to identify geochemical trends related to mineralization.

The Max-Min II survey outlined a poor conductor with coincident magnetic and gravimetric anomalies that was picked up by previous surveys. Drill holes DE 80-4 and 80-5 were put down to test it. Gravity anomalies occur in several places including over the main sulphide zone.

Logs and chemical analyses from drill holes DE 80-1 to 80-5 inclusive are also reported. The best intersections in these holes are summarized below.

Hole No.	Interval (metres)	Width (metres)	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
DE 80-1	177.58-178.46	0.88	1.31	0.01	0.077	0.82
DE 80-2	181.44-182.91	1.47	0.01	0.29	1.19	7.89
DE 80-4	64.46- 64.62	0.16	1.24	0.35	0.11	32.23
	64.77- 65.26	0.49	0.04	0.40	1.80	9.26
	66.05- 66.48	0.43	0.03	0.55	1.20	9.60
	66.72- 67.00	0.28	0.05	0.90	1.34	16.46
DE 80-5	104.39-104.79	0.40	0.36	0.66	4.36	8.57
	105.89-106.65	0.76	1.00	0.04	0.04	4.11
	107.20-107.93	0.73	1.12	0.01	0.03	Trace

(f) Swamp Lake Project 206 21 O/8E

Work reported on this 125-claim group consists of a compilation of previous work. A minor pyrite-chalcopyrite showing is known on this property, and most of the work has attempted to find extensions of the mineralization. The rocks comprise basaltic and rhyolitic volcanics, intercalated with slate and siliceous phyllite. Magnetic anomalies generally outline the basaltic rocks, whereas electromagnetic anomalies trace graphitic rocks and disseminated sulphides.

(g) M.L. 1179 Project 120 21 P/5W

This property is tied to the northeast corner of the Brunswick No. 12 Crown grant. The work reported in 1982 consisted of line cutting and magnetometer and gravity surveys.

Magnetic anomalies reflect underlying basaltic volcanic rocks and intercalated red and green (in part) magnetic argillites. Gravity anomalies appear to be due to diorite or gabbro.

(h) Flat Landing Brook (Sabina Option) M.L. 1273 21 P/5W

The Flat Landing Brook Zn-Pb-Ag-Cu sulphide deposit was discovered by Sabina Industries in 1975 (see N.B. Mineral Resources Information Circular 83-2, p. 64-65). Work reported in 1982 comprises line cutting and magnetometer, gravity, VLF-EM and Max-Min II surveys, and the drilling (holes 161-10-81, 161-11-81 and 161-12 to 15 inclusive) plus extensions of 4 previous holes (76-5 to 76-8 inclusive). Directional logging was also carried out in 5 new holes.

All 1982 drill holes were put down in the so-called No. 11 zone. The best intersections are as follows:

Hole No.	Interval (metres)	Width (metres)	Cu %	Pb %	Zn %	Ag (g/t)	Au (g/t)
61-10-81	702.72-704.82	2.10	0.02	1.3	2.9	2.06	0.03
	732.65-732.74	0.09	0.08	3.15	15.5	142.29	0.27
76-5 Extension	161.30-179.10	17.80	0.24	2.69	4.33	61.37	0.058
161-13-82	4.27- 7.32	3.05	0.05	0.16	3.84	2.74	trace
	8.53- 16.76	8.23	0.06	0.66	3.03	8.91	0.03

(i) Sheephouse Brook Project 171 21 O/1E

This three claim group was optioned from R. Bujold in 1981. The initial interest in this area stems from a Zn-Pb-Cu-Ag prospect found to the north (M.L. 1241) in 1956 by Bellechase Mining Company Limited. In 1982, gravity and Max-Min II surveys were carried out on the claims, and a drill hole was put down to test the resulting coincident gravity - EM anomaly. Drill hole 171-82-1 cut mainly intercalated mafic volcanic rocks and quartz sericite tuffs, but layers of chert, mudstone and graphitic and siliceous sedimentary rocks also were encountered. No significant concentrations of sulphides were discovered.

(j) Canoe Landing Lake Extension Project 211 21 O/8E

This property comprises 57 claims surrounding M.L. 1231 (Canoe Landing Lake sulphide deposit). Assessment work reported consists of line cutting, Max-Min II, magnetometer, soil geochemical, gravity and geological surveys.

The area is underlain by folded mafic and felsic volcanic rocks intercalated with argillite, greywacke and minor iron formation. The Canoe Landing Lake massive sulphide layer occurs between a hanging wall of basaltic and gabbroic rocks and a footwall of argillaceous sediments, and lenses of felsic volcanic rocks.

The Max-Min II outlined two weak conductors, one of which is coincident with a gravity anomaly. Soil samples were obtained from the "C" horizon, because of poor results obtained in the "B" in past surveys. The soil results delimited two zones, one associated with the known sulphide deposit, the other occurring to the south, trending southeast, is not explained in the report.

Three small magnetic anomalies are caused by basaltic volcanic rocks.

(k) Rogers Lake Camp Group Project 215 21 O/8

Work reported on this group comprises geological, Max-Min II, EM, magnetometer, gravity and soil geochemical surveys.

The area is underlain by greywacke, argillites and tuffaceous sediments (including manganiferous argillite) that are overlain by and intercalated with a variety of felsic crystal tuffs, porphyries and rhyolites. The youngest rocks are massive and pillowed basalts with associated gabbro.

Strong Cu-Zn-Ag and Pb-Zn anomalies were delineated in soils.

Several EM conductors were outlined; most seem to be related to sedimentary rocks. Two gravity anomalies are related to gabbro and basalt, however, a third is coincident with Zn soil and EM anomalies.

(l) A'Hearn Brook Option 21 O/8E

This twelve claim group was optioned from W.P. Hachey in 1979 (see N.B. Mineral Resources Division Information Circular 83-2). A small sulphide deposit was found on the property by Findathoran Syndicate in 1968-69.

The work reported in 1983 comprises 1981 and 1982 drilling and geophysical and geochemical surveys. Five new holes were put down (145-1 to 145-5 inclusive) and logs for unreported drill holes by Findathoran Syndicate are also presented (OH-5, -8, -9, -10, -12, OH-32 to OH-43 inclusive, and OH-55).

Four of the new holes tested the A'Hearn Showing and one was drilled to investigate a stratigraphic horizon 100 m (300 feet) below the main zone.

Two holes intersected narrow layers of sulphides, the best assays are as follows: (Main Zone "A")

Hole No.	Width metres	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
145-3-81	0.21	0.18	3.00	3.88	15.43
145-4-81	0.43	0.02	0.84	0.81	5.49
	0.85	0.01	0.05	0.07	32.23

Hole 145-5-81 cut two sulphide concentrations denoted as the "B" zone, approximately 50 m structurally above the "A" zone at a depth of 207 m. The assay results are as follows:

Hole No.	Width metres	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
145-5-81	1.22	0.1	2.14	3.25	5.14
	1.33	0.14	3.94	4.72	5.83

(m) Strachens Lake Brook M.L. 1340 21 O/8E

A sulphide deposit was found on this property by Findathoran Syndicate in the early seventies. Drilling tested low- grade pyritic Zn-Pb about 3 m wide over a strike length of 610 m, and to a depth of 100 m. The work reported consists of geological, soil geochemical, Max-Min II, magnetometer and gravity surveys and the results of two diamond drill holes.

The area is underlain by intercalated schistose felsic lithic and lapilli tuffs, graphitic argillite, chert, hematitic argillite, mafic volcanic rocks intruded by gabbro and aplite.

The Zn and Pb soil anomalies 30 to 120 m wide, were outlined for 490 m. No strong anomalies occurred over the main sulphide zone. Several EM conductors were delineated, the strongest was caused by a pyrite-pyrrhotite stockwork. Weak anomalies were associated with the broad Zn-Pb anomaly mentioned above. Several residual gravity anomalies were discovered. The strongest appears to be underlain by gabbro.

Strong magnetic anomalies are attributed to magnetite-bearing hematitic argillite.

Two drill holes were put down to test a good Max-Min II conductor and a moderately strong geochemical soil anomaly 425 m east of the main sulphide zone. The target proved to be a stockwork of pyritic-pyrrhotite 20 m thick, grading into a 30 m zone of disseminated pyrite, sphalerite and galena, 240 m to the north.

(n) Clearwater Group Project 140 21 O/1E

This very large group comprises 1179 claims. The geology of the area consists of polydeformed felsic and mafic volcanic rocks and sedimentary rocks of the Tetagouche Group (see N.B. Mineral Resources Division Information Circular 83-2). The 1982 campaign focused on south-central claims and the Bear Lake and Kenny Lake Grids in the northern part of the group.

Linecutting, Max-Min II, magnetometer, soil geochemical and geological surveys were carried out in these areas. Gravity surveys were also a part of the south-central exploration. The principal targets investigated in 1982 are in the vicinity of the Sheephouse Brook (Bellechase) (M.L. 1241) Zn-Pb prospect. They are the Head Pond area 2 km to the northeast, a strong Ag soil anomaly near Kenny Lake, and an EM conductor near Bear Lake.

The Bear Lake area is underlain by mafic volcanic rocks with minor intercalation of metasediments and felsic tuff. EM conductors are thought to be graphitic sedimentary rocks; however, one conductor is coincident with a sulphide-rich zone discovered in 1955 by Algoma Ore Properties. Algoma's drill hole No. 4, assayed 1.1% Pb, 0.3% Zn and 3.09 g/t Ag over 15 m .

The Kenny Lake area is underlain by predominantly felsic tuffs and fragmentals overlain by basaltic volcanics. The Pb and Zn soil anomalies that aroused interest in the area occur near drill holes put down in 1975 by Kerr Addison. Fortunately, the drill core from these holes is stored at the Mineral Resources Office in Bathurst and a re-examination revealed sulphide stringers and veins in five zones over nearly 30 m. The best assay was 0.3 m of 0.15% Cu, 0.12% Pb, 8.16% Zn, 6.17 g/t Ag at a depth of 53 m.

The Sheephouse grid area is underlain by highly deformed felsic, mafic volcanic rocks and metasedimentary rocks. The structure appears to be dominated by north- to northeast-trending intrafolial F_1 folds overturned to the northwest and an associated intense S_1 cleavage. F_2 folds with steeply dipping axial planes have refolded S_1 about northwesterly trending axes.

Several targets were outlined by geochemical and geophysical surveys. The southwestern extension of the Bellechase zone comprises pyritized and silicified felsic and mafic volcanic rocks, but with only minor base metals. The northeastern extension as indicated by soil geochemical and gravity/VLF-EM anomalies was tested by three drill holes, 140-82-1, 140-82-2, 140-82-3. Significant concentrations of sulphide minerals were found in 140-82-1, the best assays were as follows:

Hole No.	Interval (metres)	Width (metres)	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
140-82-1	23.44-24.14	0.70	0.08	0.10	1.40	2.06
	27.43-27.68	0.25	0.005	0.07	1.07	6.17
	31.06-31.70	0.64	0.009	0.34	2.11	1.71
	33.35-33.53	0.18	0.02	0.04	3.30	3.43

(o) Tower Group Project 173 21 P/5W

This property comprises 45 claims adjoining M.L. 1171 and M.L. 1248. The work reported comprises geological, soil geochemical, Max-Min II, EM and magnetometer surveys. The area straddles the contact with northeasterly trending metasedimentary rocks (in part graphitic) and a small felsic volcanic dome, comprising a variety of pyroclastic rocks and thin intercalated iron formation.

The Max-Min survey outlined 3 or 4 formational conductors, which appear to mark the "favourable" contact. The cause of other conductors is not known. Soil geochemical anomalies are associated with long formational conductors. Iron formation is the cause of the strongest magnetic anomaly.

(p) Canoe Landing Lake Project 212 21 P/5W

This mining licence, owned by Clearwater Mines Limited, covers a massive low-grade pyritic Zn, Pb, Ag sulphide deposit.

The work reported comprises soil geochemical, Max-Min II, EM and geological surveys. Soil samples obtained from the "C" horizon, outlined a small anomaly over the sulphide body, and another 122 to 240 m north of the deposit. The Max-Min survey (444 to 1777 Hz), using a 240 m (800 feet) coil spacing, confirmed a known conductor but no conductor was associated with the soil geochemical anomalies, or with pyrite stringers and disseminations found in outcrop.

A compilation of all drilling data indicates that the Canoe Landing Lake deposit comprises two main massive sulphide lenses, and three smaller bodies intercalated with metabasaltic volcanic rocks, gabbro and metasedimentary rocks. The reserves have been calculated as follows:

Tonnes	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)	Au (g/t)
16,638,000	0.57	0.61	1.71	31.5	1.23

(2) **Mattagami Lake Exploration Limited**

(a) Miramichi Zone-East Extension 21 O/8E

Geological and soil geochemical surveys were carried out on this claim group adjoining the eastern boundary of the Heath Steele Mines lease.

The claims are underlain by several varieties of foliated felsic and chloritic tuffs, mafic volcanics and gabbro. The supracrustal rocks are folded about northwest-southeast trending, easterly-plunging axes.

The soil survey indicated that the soils of the entire area are anomalous in Pb (100 ppm). Within this large area, there are several smaller Pb soil anomalies ranging from 200 to 500 ppm.

(b) Hope "L" Group 21 O/1E

Work reported on this group comprises a picket line survey (7.6 km).

(c) Miramichi Project 21 O/8E

Work filed on this claim group (128 claims) in 1983 comprised induced polarization (IP), resistivity and magnetometer surveys, and diamond drilling.

The IP survey outlined 10 anomalous areas within felsic volcanic rocks. Three of the best indications were tested with four drill holes M-82-1 to M-82-4 inclusive. M-82-1, 82-2 and 82-3 cut a variety of rhyolitic volcanic rocks, mainly fine-grained "cherty" rhyolite, rhyolite porphyry and mafic volcanic rocks. The source of the IP anomalies appears to be disseminated pyrite (10 to 15%) over widths of 1 to 15 m and graphite. Base metal content in these sections is insignificant. M-82-4 cuts 12 m of rhyolite and agglomerate in the top of the hole, followed by 170 m of mafic volcanic rock.

(d) Mountain Brook 21 O/1E

Max-Min II, EM, proton magnetometer, induced polarization, resistivity and VLF-EM surveys were carried out on this property in 1981-82.

The magnetometer survey outlined zones of east-west trending magnetic anomaly, presumably mafic volcanic rocks intercalated with felsic volcanic and sedimentary rocks (as indicated by N.B. Mineral Resources Division mapping).

The Max-Min survey indicated weak quadrature anomalies associated in part with magnetic anomalies. The IP survey indicated a broad frequency-effect zone, flanking the southern magnetic zone, and a previously outlined geochemical (presumably soil) anomaly. Three VLF-EM anomalies north of this zone are thought to be contacts and/or faults.

(3) **Billiton Canada Limited**

(a) Half Mile Lake 21 O/8W

Work filed in 1983, comprises the results of geological, geochemical, VLF-EM, Max-Min II EM, EM-16, and magnetometer surveys carried out on the Half Mile Lake massive sulphide deposit, optioned from Kidd Creek Mines, and 181 surrounding claims.

The area is underlain by an east-west trending, north-dipping, overturned sequence of quartz-feldspar porphyry, felsic tuffs and agglomerate, sericite-quartz-pyrite schist, metasedimentary rocks (host to the massive sulphides) and mafic volcanic rocks.

The structure is dominated by east-northeast trending recumbent folds whose axial planes dip gently north. Of the faults mapped, the most significant seems to be a northwesterly dipping thrust marked in part by Moody Brook. The repetition of sulphide-horizon stratigraphy has not been recognized to the north of the Half Mile Lake sulphide outcroppings. However, such a possibility has not been ruled out.

Analysis of 5,324 soil samples revealed several anomalies, although the best ones are thought to be associated with the two known sulphide bodies, i.e. Half Mile Lake (Kidd Creek-Conwest) and Half Mile Lake (North), owned by Mattagami Lake Mines. Other Pb, Zn, Cu, and As anomalies are worthy of further investigation. The VLF-EM and magnetometer surveys, as expected, yielded strong anomalies over the sulphide deposits and their strike extensions. A number of strong isolated conductors outlined require further investigation, especially those with associated base metal soil anomalies.

Nineteen targets have been identified for future work.

(b) Fall Brook Property 21 J/15E

This group comprised 9 claims optioned from Delbert Johnston and 11 claims staked by Billiton.

The work filed in 1983 consists of a geochemical survey and trenching of resulting anomalies.

The area straddles a contact metamorphic aureole involving Ordovician phyllite and greywacke, and the Dungarvon granite. The geochemical soil survey resulted in the discovery of several Mo, W and Sn anomalies. Forty-two bulk till samples obtained from 360 m of trenches had not been analyzed at the time of filing.

(c) Todd Mountain M.L. 1337 21 J/10E

This claim group was originally staked by Shell Canada Limited on the basis of high Sn content of tills (see N.B. Mineral Resources Division, Open File Report 81-25). The area is underlain by a contact metamorphic aureole involving Devonian granite and Ordovician metasedimentary rocks.

The work reported in 1983 comprises trenching the Sn-W anomaly (600 m x 400 m). The geological mapping and sampling were not completed at the time of filing (see also Shell Canada Resources, 11a).

(d) Restigouche Sulphide Deposit M.L. 1237 21 O/7E, O/10E

This property covers a relatively small, but good grade Zn-Pb-Ag massive sulphide deposit discovered by New Jersey Zinc Company in the late fifties and early sixties. Billiton Canada Limited optioned the property in 1979-80 and carried out detailed investigations until they dropped their interest in 1983. The work filed by Billiton in 1983 comprises a summary of 1980-82 exploration and the results of borehole and Deep EM surveys.

In 1980, 4,968 m of drilling was carried out to obtain metallurgical samples and to test the deeper extensions of the sulphide deposit. About 90,720 tonnes were added to the reserves. In 1981, exploration comprised 66 km of picket lines, collection of 2,975 soil samples, approximately 55 km of VLF-EM, magnetometer and Max-Min II surveys, borehole EM (9 drill holes) and Deep EM over the so-called C-4 and C-5 zones north of the main deposit.

The lithogeochemical study of rocks cut in drill hole CP-39 indicates the massive rhyolite at the bottom of the hole, below the massive sulphides, is similar to that overlying the sulphides. This may indicate sulphides at depth.

A soil geochemical survey revealed strong Pb, Zn, Ag anomalies over the main deposit and the C-4, C-5 zones to the north. Anomalous Hg also outlines the main orebody.

Spectral EM strongly indicated the deposit, but the results of the borehole EM and Deep EM surveys were not encouraging.

Magnetic results were useful in outlining mafic tuffs and lavas, ferruginous sediment, and, in places, late northwesterly trending dykes.

The VLF-EM survey outlined graphitic rocks, dykes, faults and the C-4 C-5 sulphide zones. However, no conductors are shown over the massive sulphide body.

The Max-Min II EM survey confirmed the poor conductivity of the massive sulphide deposit. Good responses were recorded only over the south end (near surface) at higher frequencies.

Gabbro and massive sulphides give rise to residual gravity anomalies. The gabbro anomalies are concordant, whereas the sulphide anomaly is discordant due to the northerly-plunging, flattened, pipe-like shape of the deposit. The deposit is represented by a 0.6 mgal anomaly at its south end (outcropping), but it can be outlined at the north end (down plunge) by the 0.1 mgal contour.

In 1982, Billiton staked the area between the Restigouche Mining Licence 1237 and the Murray Brook Mining Licence 1180 to the east. They report line cutting, magnetometer, VLF-EM and Max-Min II EM surveys over Mining Licence 1237 and the newly staked claims.

Five trenches and 21 diamond drill holes tested the targets outlined as well as extensions of known sulphide bodies. No new significant sulphide concentrations were found.

Five holes tested the northern extension of the Restigouche deposit (B-82-4, 82-7, 82-10, 82-14 and 82-20). B-82-7 cut 0.7 m assaying 0.26% Cu, 9.40% Pb, 12.00% Zn, 93.60 g/t Ag and 1.097 g/t Au. B-82-10 intersected 1.2 m of massive sulphides at a depth of 263.6 m that assayed 0.16% Cu, 6.20% Pb, 8.0% Zn and 74.67 g/t Ag.

Hole CP-39 was deepened to test lithogeochemical evidence (see above). However, no sulphides were encountered.

(e) Portage River, M.L. 1238 21 P/5W

This property is actually just north of the Nepisiguit River Narrows, several miles north of the Portage River. Work reported in 1983 comprises a geological survey and a compilation of previous work.

The property is underlain by northerly trending intercalated rhyolite tuff, feldspar porphyry, sedimentary rocks and mafic tuff. Previous work indicated a weak Max-Min II conductor, and scattered Zn, Pb and Cu soil anomalies.

(4) **Kidd Creek Mines Limited**

(a) Rocky Brook North M.L. 1335 21 J/10E

Work filed in 1983 consisted of a radiometric survey and a soil geochemical survey.

The region is underlain by Cambro-Ordovician gneisses and metagranites overlain by metasedimentary rocks and volcanic rocks of the Tetagouche Group. Intrusions of Devonian granitic rocks have produced contact metamorphic aureoles, with interesting occurrences of Mo, Sn and W minerals.

The radiometric survey generally outlined the granitic terrane (120 to 300 cps), and the contact with metamorphosed sedimentary rocks. Soil samples were analyzed for Mo, W and Sn but only Mo anomalies were outlined.

(b) M.L. 1334 21 J/10E

Work carried out in 1982 comprised limited soil geochemical and scintillometer surveys.

In general, over sedimentary rocks readings ranged from 75 to 110 cps in the northwest, and from 100 to 160 cps in the southeast. Three anomalies (1,500, 850 and 600 cps) were found in the northeast. Trenching of the 1,500 cps anomaly revealed a concentration of 93 ppm U_3O_8 in the organic "A" layer, and 12.9 ppm one metre deeper. Granitic rocks could be divided into

two terranes. The north and northeast is characterized by 80 to 150 cps, whereas in the southwest and south the range is from 100 to 415 cps. Fluorine (up to 5,800 ppm) and Mo (up to 98 ppm) anomalies occur over granite, and over sediments in the south. One anomaly over sedimentary rocks (5,800 ppm F, 66 ppm Mo, 60 ppm W, and 50 ppm Sn) occurs north of wolframite-bearing boulders.

(c) Dungarvon East Group 21 J/10E

This 62 claim group is underlain by pink to red Devonian granite with phases of pink quartz-feldspar porphyry that intrude lithic greywacke, siltstones and shale.

Work reported in 1983 consists of linecutting, radiometric, soil geochemical, magnetometer, VLF-EM and geological surveys. Only the results of the radiometric survey were filed. East-west trending radiometric anomalies (100 cps) are ubiquitous. Anomalies (200 cps) occur in the northern, northwestern, and southeastern parts of the group. The significance of the results is not discussed.

(d) Falls Brook 21 J/10E

This group makes up the southeastern corner of a group of properties (see 4a, 4b, and 4c). Results of geological, soil geochemical, scintillometer, VLF-EM, IP and magnetometer surveys are reported in 1983.

Radiometric readings generally range from 90 to 130 cps but higher counts (up to 180 cps) in the southeast probably indicate granite bedrock and/or granite-bearing till. An area of low counts (50 cps) is parallel to Sn and Cu soil anomalies, but, its significance is not known.

A soil anomaly (up to 145 ppm) trending east-northeast can be traced 1,600 m across the property and into adjoining claims on the west. Two smaller anomalies ranging up to 63 ppm Sn, occur further southeast. The higher Cu content follows a similar trend but is offset to the southeast. The source of the large Sn anomaly is a calc-silicate argillite containing relatively high Sn (unit A on geology map accompanying assessment report). The magnetic survey outlined the southern contact of the argillite with unit B (greywacke), however, most of unit B is in a magnetic zone. VLF conductors are discontinuous but generally follow structural trends. An IP anomaly coincides with the best VLF-EM conductor.

(6) Riocanex Inc.

(a) McDonald Brook 21 J/10W

Initial interest in this area stemmed from a N.B. Mineral Resources Division stream silt survey published in 1976. Follow-up soil sampling outlined a Pb anomaly. Magnetometer and VLF-EM surveys indicated the anomaly was not satisfactorily explained by disseminated pyrite and minor sphalerite.

The work reported in 1983 comprised geological, soil geochemical, magnetometer, Max-Min II EM, and gravity surveys.

The area is underlain by Ordovician quartzites and paragneisses that are intruded by syntectonic Ordovician granite and post-tectonic Devonian granite (Nashwaak Granite). The granite is truncated on the north by a prominent northwesterly trending fault. Rocks in old trenches comprise schist containing sericite, quartz, fuchsite, feldspar, with accessory pyrite, sphalerite, galena, rutile and possibly beryl; a dark coloured pyritic sillimanite-biotite, andalusite rock (metasediment) with minor fluorite and tourmaline; a pyritic mafic dyke, and a two-mica leuco-granite dyke one metre wide. There are no obvious sources for the geophysical anomalies. Two EM conductors were detected; one in the central zone correlates well with a magnetic and gravity anomaly.

Three significant Cu, Pb, Zn and Ag soil anomalies were outlined. One is associated with a magnetic anomaly. Two drill holes are recommended.

(7) B.P. Minerals

(b) West Wedge 21 O/8E

This 32 claim group was optioned from Northeast Exploration Services Limited in 1981. The area has been subjected to exploration by several companies since 1953.

Work reported in 1983 consists of Max-Min II EM, soil geochemical, magnetometer, induced polarization, and geological surveys. The targets found were tested by 8 drill holes (WW 82-1 to WW 82-8).

The area is underlain by highly deformed felsic volcanic rocks with intercalated basalt and metasedimentary rocks. The latter comprises massive metaquartzite-phyllite, and apparently younger dark grey, in part graphitic, greywacke, argillite and siltstone (in part tuffaceous). Chloritization with associated pyrite-chalcopyrite and quartz veins occur in several places. Chert appears to be present in each sedimentary unit. A black variety intercalated with argillite is the host to sulphide mineralization found previously by Tribag. The felsic

volcanic rocks comprise weakly foliated rhyolite, feldspar-quartz or feldspar crystal tuff, and quartz-feldspar porphyry. Sulphides were discovered in trenches and drill holes by Cominco (1959-63). Estimates of grade ranged up to 2% Pb and 4% Zn over 1.5 m. Massive sulphides were also discovered by Essex Minerals further west.

The soil geochemical survey revealed several Cu, Pb and Zn anomalies in the eastern part of the group. EM surveys detected several conductors, most of which had been drilled in previous campaigns.

Drill holes 82-1 to 82-5 were put down to investigate coincident Pb, Zn and Max-Min II anomalies. Hole 82-1 cut tuffaceous sediments, cherty and pyritic tuff, manganiferous chert and felsic volcanic rocks. Graphite zones were numerous. Zones of pyrite and graphite in hole 82-2 probably explain the EM response, but the geochemical anomaly remains unresolved. Drill hole 82-3 was stopped short of its objective when it turned down dip. Hole 82-4, aimed at the same target from another direction, cut mostly dark argillite with thin tuffaceous layers. Hole 82-5 encountered tuffaceous rocks, greywacke, manganiferous chert, felsic volcanics, and in places pyritic tuff. No significant concentrations of Pb, Zn or Cu sulphides were encountered.

Drill holes 82-6, 82-7 and 82-8 were drilled in the so-called Tribag zone (discovered by Cominco). The holes were spotted to test Max-Min II conductors. Hole 82-6 was stopped at 27.4 m when it turned down dip. The predominant rocks in 82-7 and 82-6 are argillites (in part graphitic) interbedded with greywacke and siltstone. Several layers of chloritic quartz porphyry, cherty tuff, and lithic tuff were encountered. No significant base metal sulphides were found. Hole 82-8 intersected cherty tuff, in part pyritic, graphitic argillite and weakly pyritic felsic tuffs.

(8) **Cominco Limited**

(a) Nepisiguit Property 21 O/8

Work comprised a survey by a new time-domain EM system developed by Cominco, called UTEM II. The aim was to test possible deep extension of the three low-grade massive sulphide deposits, known as Nepisiguit "A", "B", and "C".

The results showed a strong response from the known sulphides but also outlined an untested conductor west of the "A" sulphide body. Several shallow conductors were also detected. Several drill holes were recommended.

(9) **Orville O'Connell**

(a) O'Con West 21 O/7E

Work reported on these claims consist of grab sampling of mineralization, indicated on N.B. Mineral Resources Division Geology Map M-7 as manganiferous hematite and pyrite. Two trenches were excavated.

(11) **Shell Canada Resources** 21 J/10E

(a) Todd Mountain Area

Shell work reported in 1983 comprises geological and geochemical surveys carried out up to August 1981 (see also Billiton Canada, 3).

Shell resampled drill core from four holes drilled by others (CIP) in 1976, and found 200-900 ppm Sn was associated with chloritized and bleached zones containing arsenopyrite-quartz-chlorite veins, whereas 200 ppm Sn occurs in country rock. The mineralization of interest occurs along joint sets 115° to 120° dipping 80° northeast contain cassiterite, fluorite, arsenopyrite, muscovite, quartz and chlorite.

The geochemical survey outlined several Sn soil anomalies (20 ppm). The best ones are concentrated in the central part of the property.

(15) **Anaconda Canada Exploration Limited**

Armstrong "B" 21 O/9E

Work reported in 1983, comprises an Apex Max-Min II horizontal loop EM survey. The property covers a low-grade massive sulphide deposit hosted by north-south trending schistose felsic tuffaceous rocks of the Tetagouche Group. The survey defined a strong (35 ohms), relatively shallow conductor that corresponds to the sulphide zone. The feature was detectable with both 100 m and 200 m separations.

(17) **Elmtree Resources Limited**

(a) Armstrong Brook Dolomitic Limestone 21 P/12W

This property was staked in 1982 to cover an occurrence of dolomitic limestone intercalated with phyllite, calcareous sediments and tuffs of the Tetagouche Group.

Work reported comprises geological mapping and sampling. The dolomitic limestone occurs as a southwesterly-trending, steeply dipping deformed bed(s) approximately 60 m wide and at least 610 m long.

Mapping, trenching and sampling have outlined 2.500 tonnes of rock grading 57.7% $CaCO_3$ and 36.4% $MgCO_3$. A road was constructed into the deposit in 1983, and production was scheduled to begin in July 1983.

(18) **Amoco Canada Petroleum Limited**

(b) Taylor Group Option 21 O/1E

This 25-claim group was optioned from Arthur Taylor. The area is underlain by polydeformed metasedimentary rocks of the Tetagouche Group. Work reported comprises 33.5 km of line cutting.

(19) **Norman Pitre**

Roche Claim Group 21 P/4W

This property covers a Zn-Pb-Cu sulphide prospect discovered by American Metals in the fifties. Work reported in 1983 consists of a small gravity survey on three picket lines. A distinct 0.2 mgal anomaly was outlined.

(20) **Miramichi Lumber Company Limited**

Slate Island Brook Group 21 J/10W

This claim group is underlain by southerly trending Cambrian-Ordovician thin-bedded quartzite, siltstone and slate overlain by dark grey laminated siltstone (in part graphitic) with intercalated greywacke, chert, conglomerate and grit. The supracrustal rocks are intruded by diabase and granite (outside the property).

Work reported in 1983 comprises geological and soil geochemical surveys. Nine hundred forty-six samples were analyzed for 31 metals. Scattered Sn, W and Mo anomalies were detected in the eastern part of the group.

EDMUNDSTON, AROOSTOOK-MATAPEDIA AND TOBIQUE-CHALEUR ZONE

(1) **Brunswick Mining and Smelting Corporation Limited**

(a) Gold Brook Project (440-180) 21 O/7W

This 49-claim group straddling the Serpentine River was staked because of gold anomalies outlined in a heavy mineral survey.

Work completed in 1982 comprised geological mapping and soil geochemical surveys. The area is underlain by southwesterly trending schistose Ordovician metasedimentary and metavolcanic rocks that are unconformably overlain by flow-banded Devonian rhyolite and sedimentary rocks in the northwest corner of the claim group.

The soil analyses outlined a large Pb-Zn-Ag anomaly in the north-central part of the group and several small anomalies scattered throughout the claims.

(6) Riocanex

(b) Caribou Creek 21 O/10E

These claims were optioned from Ken Whaley in 1981. The original interest began with the discovery of a stream silt anomaly in 1975. Amoco outlined several Cu, Pb, Zn and Ag soil anomalies in a follow-up survey. The work reported consisted of a heavy mineral survey to investigate a gold occurrence.

The area is underlain by northeasterly-trending Upper Silurian flow-banded rhyolites and felsic pyroclastics of the Chaleurs Group.

A heavy mineral concentrate was obtained in 1981 from an anomalous sample site (N.B. Mineral Resources Division, Open File Report 81-6) by panning 20 kg of silt. A further concentration was achieved with heavy liquids. An analysis of the -60 to +150 mesh heavy fraction yielded the following (in ppm except for Au):

Au ppb	Cu	Pb	Zn	Ag	Mo	As	Sb	Bi	Sn	W	F
3700	98	530	4300	2.5	6.0	--	--	0.3	3	--	--

A silt (-80 mesh) sample from the same site analysed:

Cu	Pb	Zn	Ag	Mo	As	Sb	Bi	Sn	W	F
8	870	1400	2.0	5.0	120	6.0	0.2	--	11	610

Later in the year four panned concentrates from the same stream assayed 20 to 200 ppb Au.

Reconnaissance VLF-EM and magnetometer surveys revealed a weak conductor and a magnetic anomaly within the soil anomaly outlined previously by Amoco. Prospecting failed to turn up anything of interest. Soil geochemical results were not available at the time of filing. The property has since been dropped, indicating the soil results were not encouraging.

(7) B.P. Minerals

(a) Benjamin River 21 O/16W

This 103 claim group was optioned from Essex Minerals in 1981. The claims cover a porphyry-copper type Cu-Mo occurrence discovered by Soquem, though the initial interest was initiated by a Geological Survey of Canada stream silt survey. Soquem drilled 35 holes (5,181 m) to test targets outlined by geochemical and geophysical surveys.

The work filed by B.P. Minerals in 1983 consisted of soil and silt geochemical surveys and a geological compilation. Previous work by Essex Minerals revealed Sn and W anomalies in stream heavy mineral concentrates, as well as W soil anomalies. Widespread scheelite was also detected in 25 Soquem drill holes stored at the Bathurst Regional Office of the N.B. Mineral Resources Division.

The area is underlain by Silurian limestone and clastic sedimentary rocks overlain by subaerial mafic and felsic volcanic rocks (Chaleurs Group). The Chaleurs rocks are intruded by a high level composite stock (Benjamin River complex) comprising gabbro, granodiorite, quartz-monzonite and late felsic rocks dated at greater than 370 Ma. The Cu-Mo mineralization consists of a stockwork of fine veinlets and seams with or without pyrite. In places quartz and/or calcite veins with disseminated scheelite may occur. Most scheelite, as observed under U.V., occurs as disseminated grains along narrow fractures, although one vein of massive scheelite measured 0.3 m wide. The best of the tungsten-bearing section assayed 0.14% W over 1.22 m. The tungsten mineralization is not restricted to a particular host rock, although veinlets appear to be more common in mafic volcanic rocks.

Heavy mineral concentrates were panned from five stream gravel samples in an effort to confirm the Sn and W contents obtained by Essex Minerals. The Sn content was not duplicated, but the W assays are comparable.

(10) **Esso Minerals Canada** 21 O/14W

M.L. 1251

This property is underlain by limestones and argillaceous limestone of the Matapedia Group and turbidites of the Grog Brook Group.

Work reported comprises a soil geochemical survey. The results indicate soils do not contain anomalous Pb, Zn and Cu.

(12) **Amax Minerals Exploration**

(a) Popelogan Property 21 O/15E, O/10E

The results of geochemical, magnetometer, induced polarization and geological mapping are summarized and the logs of 4 diamond drill holes are presented.

The area is underlain by calcareous sedimentary rocks of the Matapedia and Chaleurs Groups that are intruded by a small high-level granitic pluton. Two types of mineralization are present: (1) chalcopyrite-molybdenite in quartz-diopside skarn, and (2) quartz-vein-hosted Cu-Mo-W-pyrite (fluorite). Most past investigations concentrated on the skarn type. However, Amax has turned its interest to the quartz veins associated with the porphyritic phases of the pluton.

A magnetometer survey lead to the discovery of a circular magnetic feature with coincident Cu, Mo and W soil anomalies on the northeast end of the pluton. Four drill holes were put down to test this target. Hole 1029-1-81 penetrated 108 m of brecciated hornfels apparently "cemented" by granodiorite matrix; equigranular granodiorite was intersected from 108 m to 208 m. Several generations of quartz and quartz-carbonate veins cut both units. A prominent set of late bluish grey quartz veins is host to most of the Cu-W-Mo-pyrite mineralization. Some kaolinized zones and aplite dykes were also noted. Hole 1029-2-81, collared in granodiorite, penetrated hornfels breccia (35 to 65 m) and re-entered granodiorite (65 m to 154 m). A similar set of mineralized quartz veins was intersected. Hole DC-3-81 encountered mainly granodiorite with encouraging W-quartz veins. Quartz-Mo-Cu-pyrite veins were also encountered in the deeper parts of 1029-4-81, particularly in a porphyritic, subporphyritic and equigranular granodiorite. Only samples from 1029-1-81 were assayed and although the overall grade is subeconomic (61 m assayed 0.07% Cu and 0.02% MoS_2), the results are encouraging. The best assay is 0.13% MoS_2 over 1.5 m. The southeast margin of the property appears to be the site of another magnetic feature with coincident geochemical anomalies. Additional claims were staked to cover this target.

(13) **St. Leonard Iron Mines** 21 O/4W

Work reported on this Mn prospect in 1983 consists of trenching, sampling, site preparation and improvements to access roads.

Beneficiation tests by Lakefield Research of Canada confirmed at least two earlier studies that concluded the manganiferous iron formation cannot be upgraded using conventional methods (see N.B. Mineral Resources Division, Exploration Reviews, 1975, 1976 and 1977).

(16) **K.D.A. Whaley**

(a) Upsalquitch Forks Property 21 O/10E

This property was staked in 1982 to cover a Pb-Zn stream silt anomaly reported by N.B. Mineral Resources Division (Plate 81-50). Work reported comprises the collection of panned heavy mineral concentrates.

The area is underlain by Chaleurs Group (Silurian) mudstone and calcareous sandstone interlayered with, and perhaps intruded by, a rhyolite (microgranite) flow. A small occurrence of mineralized skarn was observed.

Nine heavy mineral panned concentrates were obtained by passing 23 kg of stream silt through 8 and 40 mesh sieves. The fines were then panned to about 250 gm. Heavy minerals from this sample were then obtained by heavy liquid (Tetra-Bromo-Ethane) separation. The heavy mineral fractions were analyzed for 26 elements. Several silt samples were also collected and analyzed. The results confirm the Pb, Zn anomaly detected by N.B. Mineral Resources. The source seems to be related to Pb-Zn soil anomalies outlined by Dome several years ago presumably derived from sphalerite and galena films and veinlets in hornfels near the rhyolite (microgranite) contact.

(17) **Elmtree Resources Limited**

(b) Sormany Limestone 21 O/9E

This mining licence covers a deposit of Silurian limestone (La Vieille Formation) mapped several years ago by N.B. Mineral Resources Division (Geology Map O-5).

Work reported comprised geological mapping, trenching and sampling.

The deposit consisted of two southwesterly trending, steeply dipping lenses each approximately 120 m wide and 360 m long. The limestone is highly calcitic, suitable for production of burnt or hydrated lime. Reserves quoted are 4,500,000 tonnes grading 95.4% $CaCO_3$.

(18) **Amoco Canada Petroleum Limited**

(a) Mount Costigan M.L. 1280 21 J/14E

This property was originally staked by Amoco in the early seventies to cover prominent stream silt metal anomalies. Although the anomalies were detected in the fifties by Selco and later investigated by Mount Costigan Mines Limited, Amoco carried out extensive geochemical, induced polarization and geological surveys and have drilled several holes (317) in the targets outlined. An interesting sphalerite, galena stockwork was discovered probably in 1974. The mineralization seems to be associated with a breccia pipe involving intensely altered silicified and chloritized Devonian rhyolitic flows and pyroclastic rocks. Most of the drilling has been carried out in a 600 m x 600 m area approximately 300 m southeast of Mount Costigan.

Minerais Lac Limitée optioned the property in 1981, and in 1982 carried out magnetometer, VLF-EM, induced polarization, detailed geological surveys and trenching. Amoco drill holes 1 to 27 and 79-1 were relogged and 18 additional claims were staked.

ELMTREE SUBZONE

(5) **Canadian Nickel Company**

Hickey Option 21 P/13W

This property, comprising 45 claims, covers a Zn skarn prospect (Madran Zn) in rocks of the Elmtree Group near a Devonian granite stock (Antinouri Lake stock). Considerable exploration has been carried out in the area, including several drill holes. Renewed interest in the area stems from a new showing discovered by Owen Hickey (a grab sample assayed 7.89 g/t Au).

Work reported in 1983 comprises geological, soil geochemical, magnetometer and VLF-EM surveys and the principal showing was tested by four drill holes.

The area is underlain by steeply dipping, dark grey phyllite with interbeds of chert or quartzite, marble, conglomerate and rhyolite tuff. At the Hickey showing the sulphides are concentrated in a rhyolite flow (150 m thick) near a contact with a rhyolite tuff. The sulphides, comprising pyrite, pyrrhotite, chalcopyrite and sphalerite, occur as veinlets and bands.

The known showings were marked by only medium strength Cu anomalies, though some higher anomalies (up to 260 ppm) are not explained. Ag, Pb, and Zn anomalies appear to be associated with organic samples in valleys and low areas.

Magnetic anomalies were outlined over each of the known showings, though several other small anomalies are not explained.

The VLF-EM survey detected a weak east-west conductor along the northern end of the grid, and two single line cross-overs 600 m southwest. The showings gave no response.

Four diamond drill holes, put down to test the Hickey showing, cut weak pyrite, pyrrhotite, arsenopyrite, sphalerite veinlets and bands. No gold assays comparable to the surface grab sample were obtained. The best assays are summarized below:

Hole No.	Interval metres	Width metres	Cu (%)	Pb (%)	Zn (%)	Ag ppm	Au ppm
51593	1.86-2.19	0.33	0.07	0.006	0.82	59	0.005
	2.53-2.88	0.35	0.05	0.007	1.10	85	0.035
51590	3.76-3.83	0.07	0.09	0.02	4.7	48	0.02

CENTRAL PLATFORM

(14) **Chaleur Silica Limited**

Nepisiguit Silica Property 21 P/5E

Work reported on this 6 claim group comprised five shallow drill holes to assess the silica content of flat-lying Pennsylvanian conglomerate and sandstone. No analytical results are presented.

EXPLORATION ACTIVITY IN SOUTHERN NEW BRUNSWICK

Mineral exploration in southern New Brunswick was mainly concentrated in the gold-bearing rocks along the Bay of Fundy coast. In addition to this, a fairly extensive tungsten-molybdenum-tin exploration program was conducted by Billiton Canada, Limited in the eastern St. George Batholith (Mount Douglas Granite) and west of Mount Pleasant (Figure 11).

Potash Company of America started production at their Penobsquis salt-potash deposit. The Denison-Potacan consortium started sinking a production shaft in the Salt Springs potash-salt deposit, B.P. Exploration Canada Limited successfully completed a diamond drilling program of a salt-potash deposit near Millstream.

Billiton Canada Limited started production at the tungsten-molybdenum deposit at Mount Pleasant.

MIRAMICHI ZONE SOUTH

(16) **K.D.A. Whaley**

(b) Napadogan 21 J/06E

K.D.A. Whaley holds a claim group at Napadogan, about 60 km northwest of Fredericton. The claims cover the contact zone of Ordovician sedimentary rocks and Devonian biotite granite. This ground was staked in 1981 after release of a heavy mineral survey by the N.B. Mineral Resources Division.

In 1983, Mr. Whaley panned 15 heavy mineral concentrates that were analyzed for tin and tungsten. Regular silt samples and 836 soil samples also were collected and the -80 mesh fraction was analyzed for 26 elements. In addition, an EM survey and some trenching were done. The trenches, unfortunately, had to be abandoned because of water problems. The results of the survey led to the conclusion that a tungsten-copper-silver-bearing silicified fracture zone probably exists along the contact zone of an aplitic intrusion, which cuts across the older granite in the area.

(4) Kidd Creek Mines Limited

(e) Napadogan 21 J/06E

The Napadogan claim group of Kidd Creek Mines Limited is about 55 km northwest of Fredericton. The ground was staked upon release of the results of a heavy mineral survey conducted by the N.B. Mineral Resources Division.

The claims cover the northern extremity of the Devonian Pokiok Batholith. Three phases of granitoids have been recognized, ranging from tonalite to highly siliceous granite. Prospecting in 1982 uncovered about two dozen W- and Mo- bearing boulders. One boulder composed of feldspar-quartz porphyry resembles material intersected at the Sisson Brook deposit of Kidd Creek, about 7 km to the northwest.

(22) J.J. Dolan

Spruce Peak 21 J/06E

The Spruce Peak claim group of J.J. Dolan covers a Devonian granite pluton south of the Keswick River, about 70 km northwest of Fredericton. The area was mapped and prospected for J.J. Dolan by D.V. Venugopal. Magnetometer, VLF-EM and soil geochemical investigations were conducted on the claims. One sample of 13 showed highly anomalous tungsten (115 ppm W) and 2 above background tin (11 and 12 ppm Sn).

MAGAGUADAVIC ZONE

(23) Consolidated Durham Mines and Resources Limited

Lake George Antimony Mine 21 G/14E

The Lake George antimony mine is situated north of Lake George, about 15 km north of Harvey. The ore occurs in a prominent quartz vein that cuts across Silurian, intensely folded, greywacke and slate.

Durham drilled three holes to check the down dip extension of the Hibbard vein below the newly discovered antimony ore zone. The vein was intersected in all the holes, but antimony values were low.

(24) Dallas Davis

Magaguadavic 21 G/14E

Dallas Davis holds a claim group south of the Devonian Pokiok Batholith, along the east side of Magaguadavic Lake, about 58 km southwest of Fredericton. A heavy mineral survey of stream sediment and C-horizon soils showed anomalous arsenic, bismuth, cobalt, copper, gold, molybdenum, silver, tin and tungsten. In addition to 53 samples taken in and around the

Magaguadavic claims, some 240 samples from around the margin of the southern half of the Pokiok Batholith were analyzed. The metallic anomalies appear to coincide with the axial regions of a 20 gamma aeromagnetic anomaly. An induced polarization survey of the property is necessary to delineate possible drill targets.

(1) **Brunswick Mining and Smelting Corporation Limited**

(2) Zealand Station 21 J/02W

The claim group is about 1.5 km west of Zealand Station and 25 km north of the Lake George antimony mine. The area straddles the contact zone of the Devonian Pokiok, granite batholith and Silurian sedimentary rocks. The claims cover a Be-Mo occurrence that was investigated between 1957 and 1962.

Ten bulk samples were collected from two streams draining the property. The samples were pan-concentrated in the field, separated using heavy liquids and analyzed for W, U and Mo. Soil geochemical analyses led to the discovery of a W anomaly about 150 m south of the Be-Mo occurrence.

ST. CROIX ZONE

(25) **Gleason-Rampton Explorations**

(a) North Head 21 B/10

The North Head claim group of Gleason-Rampton Explorations is in the Whale Cove-Flagg Cove areas of northeastern Grand Manan Island. The area is underlain by Cambrian or younger, intensely folded, clastic sedimentary rocks, mafic volcanics and intrusions of possible Silurian age. Low-grade, gold-bearing, quartz veins cut across the Cambrian or younger sedimentary rocks along Flagg Cove.

The company conducted a reconnaissance rock and humus geochemical survey on the property. Anomalous gold values (up to 24 ppb) are associated with a carbonated and chloritized shear zone in the southeastern part of the claim group.

(b) Ross Island 21 B/10

This claim group covers Ross Island, along the southeast coast of Grand Manan Island. Ross Island is underlain by intensely deformed, mafic volcanic and quartzose clastic sedimentary rocks of Late Precambrian or early Paleozoic age. A silicified zone occurs in black slates of the clastic sedimentary rock unit near its contact with the mafic volcanics.

The company conducted a reconnaissance rock and humus geochemical investigation on the island as an aid to finding possible economic concentrations of gold. One anomalous gold value (36 ppb Au) was found on the westward extension of the silicified zone.

(26) Appalachian Resources Inc.

Navigation Lake 21 G/03E

Appalachian Resources explored mafic and felsic intrusive rocks in the western part of the St. George Batholith. Some low gold values were detected in quartz veins cutting these rocks.

(7) B.P. Minerals Limited

(c) Nerepis 21 G/08W

The Nerepis property of B.P. Minerals is about 25 km northwest of Saint John and west of Highway 7. The Nerepis area has been intermittently explored by several companies for base metals, molybdenum, tin and tungsten from 1950 to the present. The prospect is underlain by Silurian, intensely folded, sedimentary rocks and mafic volcanics that are intruded by a Carboniferous multiphase intrusive complex. A total of 312 soil samples were collected during 1983 and analyzed for molybdenum, copper, lead, zinc, tin and tungsten. A prominent molybdenum anomaly was found along Brittain Stream.

(27) Highbourne Exploration Limited

Letang 21 G/02W

The Letang claim group of Highbourne Explorations is in the southwestern part of the Mascarene Peninsula, southwest of the town of St. George. The area is underlain by Silurian, intensely folded, mafic and felsic volcanic rocks and intercalated metasediments. There are three small base metal sulphide deposits on the property that were mined around the turn of the century. Gold is locally associated with these occurrences.

The company conducted magnetic and VLF-EM surveys on the property. Several conductors were delineated. Drilling is required to determine the source of these conductors.

(3) Billiton Canada Limited

Billiton's work during 1983 was mainly concentrated in the Pleasant Ridge, True Hill and Victoria-Square Lake areas.

(f) Pleasant Ridge 21 G/07W

The Pleasant Ridge claim group is about 10 km west-southwest of Mount Pleasant. The group is underlain by Silurian, intensely folded, sedimentary rocks that are intruded by a Carboniferous granitic stock.

MEX Exploration found a northwest-striking shear zone containing tin minerals, base metal sulphides, hematite and magnetite that cuts across Silurian, intensely folded, sedimentary rocks southeast of the Pleasant Ridge granite stock. The average grade in a trench across the vein is 8% zinc and 0.94% tin over a width of 1.75 m. The vein was traced by magnetometer over a strike length of 350 m. In 1983, four holes were drilled into the extension of the vein. Only small stringers with tin and zinc minerals were intersected by these drill holes. Some tin and tungsten minerals occur also within the Pleasant Ridge stock and abundant greisenized float, containing up to 0.2% tin, was also found.

(g) True Hill 21 G/07W

The True Hill claim group is southwest and south of Mount Pleasant. The claim group is underlain by Middle Devonian and Carboniferous granitic rocks that intrude intensely deformed Silurian metasediments.

Airborne magnetic, VLF and TRIDEM electromagnetic and radiometric surveys were conducted over the claim group during 1983. Some trenching and soil-geochemical sampling were also done.

(h) Victoria Lake 21 G/07E

The Victoria Lake claim group is about 30 km south of Lepreau in the Mount Douglas Granite, a multiphase granitic complex of Early Carboniferous age. The company cut lines, mapped the geology, prospected the ground and conducted magnetometer and VLF-EM surveys. Three main types of mineralized greisen veins occur within or along the margins of younger phases of the granitic complex. A white to pale green variety containing quartz, topaz and minor sericite occurs as bands within darker greisens. There are two types of the dark greisens: a bright green variety containing quartz and sericite and a dark green to black variety containing biotite $\pm$ chlorite in addition to sericite.

The three types of greisen may occur as single veins or vein swarms. Topaz, fluorite, pyrite, chalcopyrite, arsenopyrite, cassiterite, wolframite, molybdenite, magnetite and hematite occur in all three greisen types. The greisen veins are most abundant around and between Mistake Lake, Rocky Lake and East Long Lake in or marginal to the youngest phases of the granitic complex.

(i) Square Lake 21 G/08W

The Square Lake claim group is about 1 km west of Welsford in the Carboniferous Mount Douglas Granite. The multiphase granitic complex is cut by numerous tin-tungsten-bearing greisen veins. Magnetometer IP and geochemical surveys, trenching and some diamond drilling were conducted on the property.

Four holes were drilled in a greisen zone near Simpson Lake during 1982. One drill hole intersected 0.18% tin over 18.3 m, which included 0.33% tin over 3 m (1.5 m true width). In 1983, the down dip extension of this greisen zone was tested by diamond drilling. The best analysis returned from this drilling was 0.1% tin over 3.1 m.

(28) Acadia Mineral Ventures

(a) South Pleasant Ridge 21 G/07W

The South Pleasant Ridge claim group of Acadia Minerals covers the contact zone of the Middle Devonian, western St. George Batholith (Magaguadavic Granodiorite) and Silurian metasediments in the southern part of Pleasant Ridge. The mineralized Carboniferous Pleasant Ridge Granite stock is exposed north of the property.

The company collected 170 B-horizon soil samples at 182.9 m to 213.4 m intervals along the claim boundaries. The samples were analyzed for lead, zinc, silver, nickel and cobalt, but no significant anomalous values were found.

(b) Beech Hill North 21 G/07W

The Beech Hill North claim group of Acadia Minerals is east of the Piskahegan River Fault and north of the Carboniferous Beech Hill granite porphyry stock. A total of 819 B-horizon soil samples were collected at 30.5 m intervals along north-south claim lines. Highly anomalous tin values were found in several localities.

(4) Kidd Creek Mines Limited

(f) Beech Hill 21 G/07W

This claim group covers the Carboniferous Beech Hill granite. Tin, tungsten and molybdenum minerals occur within and in the contact zone surrounding the porphyritic granite stock. Kidd Creek conducted detailed ground magnetic and VLF-EM surveys to accurately delineate the contact of the intrusion and major faults or shear zones, respectively. No follow-up work of these surveys has been reported.

(29) Maritime Resources Research Limited

London Settlement 21 G/09E, 21 H/12W

Maritime Resources holds an extensive claim group east of the Saint John River at London Settlement. The claim group is underlain by intensely folded Silurian sedimentary rocks that are intruded by Devonian gabbro and granite.

The ground was staked because of pyrite-chalcopyrite occurrences along an east-west striking fracture zone. The company conducted an electromagnetic survey of the property, rocks were sampled and 152.4 m of drilling was carried out.

(30) **M.J. Grant and W.G. Walton**

Annidale 21 H/13W

The claim group of Messrs. M.J. Grant and W.G. Walton at Annidale is about 20 km northwest of the Town of Sussex. The claim group covers the small Annidale copper deposit, which is hosted by Silurian, intensely deformed, mafic tuffs. Also included is an intensely altered zone characterized by chromium-bearing mica and carbonate. Small amounts of gold and base metal sulphides occur locally in this altered zone.

The property was optioned by Lac Minerals Limited. This company conducted magnetic and electromagnetic surveys on the property and outlined several anomalies. Three short holes were drilled. One hole intersected 1.0 g/t g, 3,600 ppm Cu, 21,600 ppm Pb and 35,200 ppm Zn over 1.5 m.

CENTRAL PLATFORM

(3) **Billiton Canada Limited**

(j) Mount Pleasant 21 G/07W

The Mount Pleasant mine has gone into production. Both tungsten and molybdenum concentrates are being produced. Extensive underground drilling was conducted to delineate the ore zones.

(k) Mud Lake 21 G/07E & W

The Mud Lake claim group is east of Mount Pleasant. The area is underlain by Carboniferous felsic volcanic rocks. Billiton drilled three holes in an east-west striking, hydrothermally-altered breccia zone, but no metallic minerals of economic interest were intersected.

(31) **Uranerz Exploration and Mining Limited**

Duck Lake 21 G/07E & 10E

The Duck Lake claim group is situated along the eastern margin of the Mount Pleasant Caldera Complex, about 27 km south of Fredericton. The claim group is underlain by mafic and intermediate volcanic flows, fanglomerates and felsic tuffs of the Carboniferous Piskahegan Group.

A total of 72 till and stream sediment samples were collected, concentrated, and analyzed for U, W, Sn, Mo and Au. A W anomaly was found south of Duck Lake.

A scintillometer survey was carried out in the northern part of the Duck Lake claims. It is possible that the radioactive boulder occurrences are related to a northwest striking structure in the northern part of the property.

CALEDONIA ZONE

(25) Gleason-Rampton Explorations

(c) Little Dipper Harbour 21 G/01W

This claim group is west of Little Dipper Harbour and extends along the Bay of Fundy coast. The area is underlain by Carboniferous clastic sedimentary rocks and Carboniferous and/or older mafic and felsic volcanics. A major thrust fault cuts across the northern part of the property.

The geology of the claim group was mapped, and rock and humus samples were collected for geochemical analysis. Highly anomalous amounts of gold (up to 18 ppb Au) were found in humus samples north of the gold-bearing quartz veins discovered along Little Dipper Harbour by Mr. Reginald Cox of Saint John.

(d) Chance Harbour 21 G/01W

The Chance Harbour claim group is east of Chance Harbour and extends along the Bay of Fundy coast. The claims are underlain by intensely deformed, sedimentary and volcanic rocks of possible Cambrian and/or Late Precambrian age that are in faulted contact with Precambrian or younger granite.

The ground was staked because low-grade gold-bearing quartz veins were found in coastal outcrops along the northeastern part of Chance Harbour. The mineralized outcrops are chloritized, silicified and carbonated sedimentary rocks of possible Early Cambrian age.

Rock, stream and humus samples were collected and analyzed for gold. Anomalous values ranging from 4 to 358 ppb Au were found along two adjoining claims in the northern part of the property.

(e) Black River 21 H/05W

The claim group is near the mouth of Black River and extends along the Bay of Fundy coast, about 20 km east of Saint John. The area is part of a narrow northeast-striking fault block composed of Late Precambrian and/or Cambrian, intensely deformed clastic sedimentary and mafic volcanics rocks and intensely altered granite of Precambrian or younger age. Quartz veins with chalcopyrite and malachite are exposed along the shoreline near the mouth of Black River. Twenty-six rock samples were analyzed for gold but only trace amounts (up to 11 ppb Au were found). In the Beveridge Cove area, about 4 km to the southwest, similar quartz veins are gold-bearing.

(1) **Brunswick Mining and Smelting Corporation Limited**

(q) Quispamsis 21 H/05W

(r) Maces Bay 21 G/01W

(s) Hanson Stream 21 G/01W

Chance Harbour 21 G/01W

(t) Long Point 21 H/12W

(u) Fairfield 21 H/05W & E

Quaco Road 21 H/05E

(v) Porcupine Mountain 21 H/05E & 06W

(w) Seely Beach 21 H/06W

(x) Goose Creek 21 H/11E

Goose River 21 H/11E

(y) Teahan's Corner 21 H/11E & 10W

Brunswick staked a large number of claims and conducted an extensive exploration program for gold in several claim groups along the Bay of Fundy coast. No reports on this work were submitted at the time of writing this report. The claims were renewed under section 41 (11) of the New Brunswick Mining Act.

(32) **Rex Silver Mines Limited**

(a) Chance Harbour 21 G/01W

The Chance Harbour claim group of Rex Silver is about 20 km southwest of Saint John, along the Bay of Fundy coast. Anomalous amounts of gold occur in quartz veins and stockwork zones that cut across Cambrian or younger, intensely deformed, clastic sedimentary rocks and Precambrian or younger granite. The mineralized rocks are silicified, sericitized and carbonated.

The company conducted a silt sampling and reconnaissance rock geochemical program on the claim group. Although no ore grade material was found, the presence of anomalous amounts of gold, silver, copper, lead, and zinc suggests that the property merits further prospecting.

(b) Goose Creek 21 G/01W

The Goose Creek claim group of Rex Silver is about 16 km southwest of Saint John, along the Bay of Fundy coast.

Gold and small amounts of base metal sulphides occur in quartz veins and stockworks that occur mainly in Precambrian or younger, highly-fractured and altered granite. The mineralized rocks are silicified, sericitized and carbonated.

A silt sampling and reconnaissance rock geochemical program was conducted on the claim group, similar to the work carried out on the Chance Harbour property. It was concluded from the available data that the intensely fractured and altered granitic rocks on the property have a high potential for gold deposits.

(c) East Branch Black River 21 H/05W

The Black River claim group of Rex Silver is 17 km east of the Saint John Airport and about 20 km northeast of Cape Spencer.

The claim group is underlain by intensely deformed, mafic and felsic volcanics and clastic sedimentary rocks of the Late Precambrian Coldbrook Group and granitic rocks of Precambrian or younger age.

The company conducted a silt sampling and reconnaissance rock geochemical sampling program on the claim group. Most rock samples were collected from the intensely fractured and altered felsic volcanic rocks. Anomalous gold-bearing silt samples assayed between 60-274 ppb Au and rock chip samples assayed between 60 and 127 ppb Au. The anomalous samples occur in relatively well-defined zones.

(33) **P. Fenety and P. Burke**

(a) Musquash Harbour - Haley Cove 21 G/01W

P. Fenety and P. Burke staked and prospected a claim group in the Musquash Harbour - Haley Cove area. The claim group is about 16 km southwest of Saint John, along the Bay of Fundy coast. The ground was optioned by Rex Silver Mines Limited because it is, at least in part, underlain by similar sedimentary and intrusive rocks as the Rex Silver Chance Harbour claim group. The company conducted a silt sampling and reconnaissance rock geochemical program on the optioned ground, but no significant anomalies were delineated.

(b) Pork Ledge 21 G/01W

P. Fenety and P. Burke staked and prospected a claim group at Pork Ledge, approximately midway between Chance Harbour and Musquash Harbour, along the Bay of Fundy coast. The claims were optioned by Rex Silver Mines Limited during 1983.

The Pork Ledge claim group is underlain by Carboniferous, intensely deformed, clastic sedimentary rocks and Precambrian or younger granite. The granite is intensely

fractured and altered by sericitization, silicification and carbonatization. Messrs. Fenety and Burke and Rex Silver found trace amounts of gold in several localities in the altered rocks and in silt samples collected from streams draining the property. As a result of encouraging results, more work is planned on the property.

(34) Gordex Minerals Limited

Cape Spencer 21 H/04W

This gold prospect is about 400 m west of the lighthouse at Cape Spencer, southeast of Saint John. An extensive program of trenching and shallow diamond drilling led to the delineation of a hydrothermally altered gold-bearing zone, about 200 m by 400 m. The host rocks are mainly Carboniferous, intensely deformed, arkosic sedimentary rocks. The mineralized rocks are silicified, sericitized and carbonized. Diamond drilling conducted on the property during 1983 was done mainly to explore previously untested ground. More drilling is required, however, to fully delineate the gold-bearing altered zone at depth.

(35) H.C. McNamara

Millican Lake 21 H/04W

The Millican Lake prospect of H.C. McNamara is about 1 km northeast of Cape Spencer and joins the Gordex claim group. Most of the claim group is underlain by intensely deformed Late Precambrian and/or Cambrian mafic volcanic and clastic sedimentary rocks and altered granitic rocks of Precambrian or younger age. The granitic rocks are unconformably overlain by intensely deformed conglomerate and sandstone of Carboniferous age, similar to the rocks in the main mineralized zone of the Gordex ground.

An extensive quartz stockwork zone intrudes the granite and Carboniferous sedimentary rocks. Gold values have been found in the quartz stockwork zone along the southeast shore of Millican Lake. Economically interesting amounts of gold also have been panned from sand and gravel deposits in this part of the lake.

Study of the lake sands by M.W. Miner suggested that the gold-bearing sands are locally derived and may reflect a lode deposit.

In addition to the lake sediment study, a grid was cut over the entire claim group. Reconnaissance soil sampling, surface prospecting, magnetometer, VLF-EM and IP surveys were conducted on the property. Six short drill holes were also completed in the central part of the claim group, but no significant amounts of metallic minerals were intersected. The gold-bearing zone in the southeast corner of Millican Lake was not tested by diamond drilling at the time of writing this report.

(36) Cuvier Mines Inc.

(a) Black River 21 H/04W, 21 H/05W

The Black River claim group of Cuvier Mines Inc. is immediately north of West Bay, along the Bay of Fundy, about 22 km southeast of Saint John. The area is underlain by Late Precambrian and/or Cambrian intensely deformed, mafic and felsic volcanic and clastic sedimentary rocks and highly-altered granitic rocks of Precambrian or younger age. The granitic rocks are unconformably overlain by intensely deformed conglomerate and sandstone of Carboniferous age.

Copper sulphides occur along several fracture and fault zones in the claim group. These occurrences were first described by L.W. Bailey in 1898 and the area has been prospected by several companies and prospectors since that time.

Cuvier conducted a reconnaissance soil and silt geochemical program for gold on the claim group, but results were not announced at the time of writing this report.

(37) Bakertalc Inc. (M. Stewart)

Balls Lake 21 H/04W & 5W

The Bakertalc claim group is east of Balls Lake and west of Black River, about 12 km southeast of Saint John. The claim group is underlain by Late Precambrian, intensely-deformed, mafic and felsic volcanic and sedimentary rocks, Precambrian or younger granitic rocks and Pennsylvanian clastic sedimentary rocks. Low-grade gold (0.31 - 3.11 g/t) was found in quartz-hematite veins cutting the granitic rocks.

(38) J.L. Newhouse

Black River 21 H/05W

The Newhouse claim group is about 1 km east of Black River, immediately north of the Bay of Fundy coast. The claim group is underlain by intensely-deformed Precambrian and/or Cambrian mafic and felsic volcanic and sedimentary rocks and granitic intrusions. The granite is unconformably overlain by fossiliferous Windsor limestone. The limestone is cut by numerous calcite-quartz veins with some pyrite, chalcopyrite and tetrahedrite. The geology of the claim group was mapped by Donald W. Hattie.

(16) **Kenneth Whaley**

(c) Goose Creek 21 H/11E

The Goose Creek claim group is immediately west of Fundy National Park and 50 km southeast of the Town of Sussex. The area is underlain by Late Precambrian and Cambrian, intensely-deformed, mafic and felsic volcanic and sedimentary rocks. The Precambrian rocks are intruded by mafic and felsic plutons. The property includes the "Old Vernon Copper Mine" that was operated during 1864-1865. This deposit is situated in a quartz-carbonate vein that cuts Precambrian sedimentary rocks.

Mr. Whaley panned heavy mineral concentrates from streams draining the property. Silt and rock samples also were analyzed. Anomalous amounts of gold were found in intensely sericitized metasedimentary rocks. Gold values in the 100-300 ppb range are common in two anomalous zones delineated on the property.

(39) **Goldfluor Explorations Ltd.**

Little Dipper Harbour 21 G/01W

The Little Dipper Harbour Prospect was staked to cover quartz veins with chalcopyrite, chalcocite, galena and gold that cut across Carboniferous sandstone and conglomerate. The highest grade occurrence is situated along the southern limb of a northeast-trenching anticline and immediately north of an inferred fault. The veins were discovered by the president of Goldfluor, Mr. Reginald Cox of Saint Saint John. The ground adjacent to the inferred fault would appear to be a favourable exploration target. A joint venture of Noranda Exploration Ltd. and Brunswick Mining and Smelting Corporation Ltd. optioned the ground from Goldfluor Exploration. Soil geochemical and geophysical surveys were conducted and a limited amount of trenching was done, but no results were announced at the time of writing this report.

MONCTON - CUMBERLAND BASIN

(40) **A.W. Lockhart**

Campbell Settlement 21 H/12E

This high-grade silica sand deposit is immediately east of Cassidy Lake and 7 km east of the Denison-Potacan mine. Two drill holes spaced 244 m apart indicate that the deposit is chemically homogeneous to a vertical depth of 61 m. Present estimates indicate that the deposit contains in excess of 31.75 million tonnes of silica sand. The untreated material contains between 98% and 99% SiO_2 with very low amounts of impurities.

(36) **Cuvier Mines Inc.**

(b) Memramcook 21 I/02E

The Memramcook claim group is in the central portion of Westmorland County, about 70 km southeast of Moncton.

The claim group covers the Memramcook barite occurrence that was first described by L.W. Bailey in the 1897 annual report of the Geological Survey of Canada. Small amounts of galena are associated with the barite. The prospect occurs in Late Devonian and/or Early Carboniferous red sandstones and shales along the East Memramcook Fault. Barite and quartz occur as lenticular pods along the fault. A diamond drilling program conducted during 1983 intersected disseminated sulphides, but no significant amounts of barite were found in the cores.

The following areas were staked in southern New Brunswick in 1983:

MIRAMICHI ZONE SOUTH

B.P. Minerals Ltd.	Eel River	21 G/13E

ST. CROIX ZONE

Gleason-Rampton Explorations	Wood Island	21 B/10
	Three Islands Harbour	21 B/10
	White Head Island	21 B/10
Great Horn Mining Syndicate	Nantucket Island	21 B/10
	White Head Island (West)	21 B/10
Syngold Exploration Inc.	Blackland	21 G/3W
Goldfluor Explorations Ltd.	Central Tower Hill	21 G/6E
Glen Campbell	Berry Brook	21 G/6E
B.P. Minerals Ltd.	Anderson Mountain	21 G/2W
P. Fernberg	Letete	21 G/2W
Highbourne Exploration Ltd.	Frye Island	21 G/2W
Billiton Canada Ltd.	Little McDougall Lake	21 G/7E
	Foster Lake	21 G/6E
	West Sorrell Ridge	21 G/6E
	East Sorrell Ridge	21 G/6E
John Stewart	Pleasant Ridge	21 G/7W
Derek E. Brown	Hawkins Lake	21 G/2E
P. Fenety and P. Burke	Spragues Lake	21 G/2E
K.D.A. Whaley	Otter Brook	21 G/7E
	Spragues Lake	21 G/2E
	East of Bald Hill	21 G/8W
	Gaspereau Settlement	21 G/8W
Uranerz Expl. & Mining Ltd.	Sand Brook Mountain	21 G/7E
B.M. & Smelting Corp. Ltd.	Queens Lake	21 G/8W
J.J. Dolan	Nerepis	21 G/8W
Maritime Resources Research Ltd	Scotch Settlement	21 H/12W, 13W

CENTRAL PLATFORM

M. J. Grant	Upper & Lower Niles Brook	21 G/7W
William G. Walton	Lower Niles Brook	21 G/7W
Sullivan Resources Ltd.	East of Mount Pleasant	21 G/7W
H.C. McNamara	Juvenile Settlement	21 G/10E
St. Lawrence Cement Co.	East Branch Coy Brook	21 I/6W
	Beersville	21 I/6E
Provincial Holdings Ltd.	Adamsville	21 I/6E

CALEDONIA ZONE

Gleason-Rampton Explorations	East Wolf	21 G/15E
A.W. Lockhart	Dipper Harbour West	21 G/1W
Goldfluor Exploration Ltd.	Dipper Harbour	21 G/1W
	Brown's Lake	21 H/5W
Gordex Minerals	Musquash Harbour	21 G/1W
	Grassy Lake	21 H/5W
W.G. Walton	West of Lorneville	21 G/1E
Great Horn Mining Syndicate	Lorneville Harbour	21 G/1E
	North of MacFarlane Lake	21 H/5W
Seabright Resources Ltd.	Cape Spencer - West Beach	21 H/4W
H.C. McNamara	Mispec	21 H/4W
	Balls Lake	21 H/5W
Michael Smith	Hammond River	21 H/5W
J.D. Irving	Nauwigewauk	21 H/5W
J.L. Newhouse	Hebron	21 H/10W
	West River	21 H/10W
Richard Brown	Tynemouth Creek	21 H/5E
K.D.A. Whaley	Martin Head	21 H/11E
	West River	21 H/10W
	Brookville	21 H/10W
	Albert	21 H/10W
Mactaquac Mines Ltd.	Mackerel Cove	21 H/11E

MONCTON-CUMBERLAND BASIN

J.J. Collucci	Newtown	21 H/14W
Canada Cement	Glenvale	21 H/14E
	Kinnear Settlement	21 H/14W
	Steeves Settlement	21 I/3W
	Springhill	21 I/3W

MINERAL OCCURRENCES

MILLICAN LAKE GOLD — 21 G/4W

LOCATION The Millican Lake gold prospect is about 5 km northeast of Cape Spencer in Saint John County.

HISTORY The ground was staked about four years ago.

COMPANY The property is held by Mr. Harold McNamara of Saint John.

PROPERTY AND DEVELOPMENT Trenching and soil sampling have been conducted on part of the property.

This is an interesting prospect in similar rocks as the Cape Spencer deposit, but more work is required to determine its economic potential.

EMPLOYEES A bulldozer operator and a prospector were employed on the property during part of the summer of 1983.

FINANCIAL About $86,000 had been expended on the property at the time of writing this report.

RESERVES AND GRADE Unknown.

DEVELOPMENTS Economically interesting amounts of gold were discovered in sand and gravel that was panned from the southwest corner of Millican Lake.

VICTORIA-MISTAKE LAKE AREA — 21 G/7W
Billiton Canada Limited
Charlotte County, New Brunswick

DEVELOPMENTS A diamond drilling program was conducted on the property in 1983, but the results have not been announced.

For more information see Information Circular 83-2.

CAPE SPENCER GOLD — 21 H/4W
Gordex Minerals Limited
Saint John County, New Brunswick

DEVELOPMENTS An extensive diamond drilling program was conducted on the property during 1983.

For more information see Information Circular 83-2.

TEAHAN COPPER-ZINC-LEAD — 21 H/10W

Kidd Creek Mines Limited
Albert County, New Brunswick

COMPANY J.W. Moerman is manager of the company.

DEVELOPMENTS The property was restaked by Brunswick because of the presence of gold with the sulphides.

For more information see Information Circular 83-2.

LOWER MILLSTREAM URANIUM — 21 H/12E

Kings County, New Brunswick

DEVELOPMENTS Gulf Minerals has allowed the claims to lapse in 1983.

For more information see Information Circular 83-2.

ANNIDALE COPPER-GOLD — 21 H/13W

W.G. Walton and M.J. Grant
Kings County, New Brunswick

FINANCIAL It is estimated that $125,000 was expended.

RESERVES AND GRADE Drill-indicated reserves are about 90,720 tonnes grading between 2% and 7% copper. This tonnage may be increased when the limits of the deposit are determined with additional drilling.

DEVELOPMENTS The property was optioned by Minerais Lac Ltée and some diamond drilling was carried out in the gold-bearing chromium-mica zone.

For more information see Information Circular 83-2.

MOUNT COSTIGAN PB-ZN — 21 J/14

LOCATION Lat. 46°58.8'N; Long. 67°2.2'W.

HISTORY Discovered by Amoco Canada Petroleum in the early seventies by drilling coincident IP and Pb-Zn soil anomalies. Initial interest was aroused by a regional stream silt survey by Amoco. Selco and Mount Costigan Mines failed to follow up similar geochemical indications in the fifties and sixties. Amoco drilled 31 holes up to 1979. The property was optioned to Minerais Lac Limitée in 1981, who drilled several holes in 1983 and carried out extensive trenching.

COMPANY Amoco Canada Petroleum Company Limited, Mining Division, 300 - 89 Queensway West, Mississauga, Ontario, L5B 2V2. Manager is P.O. Hachey. Regional Geologists are P.J. Maingot and B. Kahlert. Amoco is a wholly-owned subsidiary of Standard Oil Company (Indiana).

PROPERTY Mining Licence 1260 (211 hectares)

PRODUCTION None.

RESERVES No figure available.

GEOLOGY Zn-Pb-Ag sulphides occur as disseminations and fracture fillings in intensely altered Devonian rhyolitic pyroclastics and flows. The deposit may be related to a breccia pipe. Most of the drilling so far has been confined to an area 600 x 600 m approximately 300 m east of Costigan Mountain.

DEVELOPMENTS Drilling and trenching by Minerais Lac Limitée in 1983; no results reported.

OUTLOOK Significant amounts of low grade Zn-Pb sulphides have been found. At least a part of the mineralized zone is near the surface, but the extent and attitude of the shoot(s) is unclear. Lac Minerais plans will probably hinge on their 1983 findings.

RESTIGOUCHE SULPHIDE DEPOSIT 21 O/7
Restigouche County, New Brunswick 21 O/10

DEVELOPMENTS Billiton dropped their option in 1983 after extensive geological, geophysical and geochemical work. Several drill holes added 90,720 tonnes to the reserves.

For more information see Information Circular 83-2.

CANOE LANDING LAKE 21 O/8E

LOCATION The property is 42 km southwest of Bathurst in Northumberland County. Access is via Highway 430. Lat. 47°24'39"; Long. 66°06'24".

HISTORY AND DEVELOPMENT The deposit was discovered in 1960 by Baie Holdings Limited, subsidiary of Consolidated Zinc (Rio Tinto) as a result of geological mapping and ground electromagentic surveys. Fourteen drill holes outlined the sulphide deposit. Clearwater Mines Limited staked the claims in 1968 and drilled nine holes to test the deposit at depth. The Keevil Group acquired the ground in the early seventies. The property was optioned by Brunswick Mining and Smelting Corporation Limited who carried out extensive geological, geochemical and geophysical work and drilled several additional holes.

GEOLOGY The northeasterly dipping (60°) massive sulphide layer, averaging 6 m in width, can be traced for 975 m along a northwesterly strike and to a depth of 305 m. It comprises massive and finely banded pyrite-sphalerite-galena-chalcopyrite that is intercalated with Ordovician slate that underlies intercalated basalt and gabbro.

COMPANY Brunswick Mining and Smelting Corporation Limited, P.O. Box 45, Suite 4500, Commerce Court West, Toronto, Ontario M5L 1B6. President is A.H. Zimmerman. Clearwater Mines Limited, P.O. Box 520, Bathurst, New Brunswick E2A 3Z1. President is I.C. Stairs.

PROPERTY Mining Licence 1231.

PRODUCTION None

RESERVES Brunswick Mining and Smelting Corporation Limited.

Tonnes	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)	Au (g/t)
16,380,000	1.71	0.61	0.57	31.5	1.23

DEVILS ELBOW COPPER DEPOSIT 21 O/8W

LOCATION The deposit is located 61 km west of Bathurst in Northumberland County. Access is via the Nepisiguit River road and Highway 430. Lat. 47°25'49"; Long. 66°24'01".

HISTORY AND DEVELOPMENT Discovered by Amax (American Metals) in 1956 as a result of ground follow-up of an airborne EM anomaly. Thirty-six drill holes, put down in 1956, outlined the sulphide deposit whose tonnage has not been changed by subsequent drilling by Cominco (one hole in 1962) and Devils Elbow Mines Limited (six holes) in 1965. The property was staked by Conwest in 1979 and subsequently turned over to Terry Mersereau. Brunswick Mining and Smelting Corporation Limited optioned the property in 1980. Further geological, geophysical and geochemical work was carried out in 1981-82. Drilling did not alter the tonnage reported by Amax.

GEOLOGY Sulphides occur in an Ordovician quartz-chlorite schist (metasediment) near its contact with quartz-feldspar augen schist. The sulphides occur as a conformable layer of disseminated and massive pyrrhotite-pyrite-chalcopyrite with minor sphalerite and galena. The layer or lense up to 46 m wide, has been traced for a strike length of 427 m and to a depth of 137 m. The lens dips east and plunges northeast.

COMPANY Brunswick Mining and Smelting Corporation Limited, P.O. Box 45, Suite 4500, Commerce Court West, Toronto, Ontario M5L 1B6. President is A.H. Zimmerman.

PROPERTY Mining Licence 1317.

PRODUCTION None.

RESERVES

	Tonnes	Cu (%)
Massive	362,880	1.2
Disseminated	154,224	0.7

HALFMILE LAKE SULPHIDE DEPOSIT 21 O/8W
Northumberland County, New Brunswick

DEVELOPMENTS Billiton dropped its interest in 1983.

For more information see Information Circular 83-2.

MURRAY BROOK SULPHIDE DEPOSIT 21 O/9
Restigouche County, New Brunswick

DEVELOPMENTS Kennco has agreed to let Anaconda sample the Murray Brook gossan core stored by N.B. Mineral Resources. Only the lower residual gossan is well represented.

For more information see Open File Report 82-31.

CAPTAIN SULPHIDE DEPOSIT 21 P/5W
Gloucester County, New Brunswick

COMPANY Former owners: Sabina Industries Limited, P.O. Box 428, Pembroke, Ontario, K8A 6X6. President - W. W. Cummins. Part of option deal with Metallgesellschaft Canada Limited, and Aquitaine Company of Canada Limited (so-called South Bathurst Joint Venture).

DEVELOPMENTS Ownership now settled as of January 31, 1983. Disputed claim awarded to A. White.

For more information see Open File Report 82-31 and Information Circular 83-2.

CAPTAIN (NORTH) DEPOSIT 21 P/5W

LOCATION Lat. 47°17.6'N; Long. 65°53.3'W. Northumberland County.

HISTORY The deposit was found in 1978 by drilling a target outlined by geology, geochemical and geophysical exploration on a large property (656 claims). The deposit is located approximately 1.5 km north-northwest of the Captain deposit, and is 38 km southwest of Bathurst. Three (78-2, 78-5, 78-9) out of nine drill holes in the 1978 program intersected mineralization.

COMPANY The claims are owned by the Sabina Group, and are under option to the South Bathurst Joint Venture, comprising the Sabina Group, Metallgesellschaft (Canada) Ltd., and Aquitaine Company. Sabina Group (Sabina Industries, Jamex Explorations Limited, McFinley Mines Limited), P.O. Box 428, Pembroke, Ontario, K8A 6X6; President is W.W. Cummins.

PROPERTY Mining Licence 1305.

PRODUCTION None.

FINANCIAL Option agreement signed in 1976 called for SBJV to spend $600,000 by 1981.

RESERVES Crude estimate based on SBJV news release (Nov. 1978) (122 m long, 45.5 m thick, 91 m depth).

Tonnes	Pb (%)	Zn (%)	Ag (g/t)
181,440	3.44	8.38	119.34

DEVELOPMENTS The mining licence inadvertently was allowed to lapse. Billiton, Noranda and Sabina interests staked claims, but ownership of the claims was split between Billiton and Noranda.

FLAT LANDING BROOK SULPHIDE DEPOSIT 21 P/5W
Gloucester County, New Brunswick

DEVELOPMENTS Brunswick Mining and Smelting Corporation Limited continued their drilling on this deposit in 1984. Drill hole data has not been reported; however, the results are thought to be encouraging.

For more information see Information Circular 83-2.

PATAPAT BROOK 21 P/13W
Restigouche County, New Brunswick

PRODUCTION None reported; however 54 tonnes may have been delivered to Belledune Smelter.

DEVELOPMENTS, 1982 to January 1984 Mining licence inadvertently lapsed in late 1982. Three parties involved in restaking the property were J.W. McCarthy, N. Pitre, and R. Archibald. The Mines Commissioner ruled in favour of N. Pitre; however J.W. McCarthy is appealing the decision.

For more information see Open File Report 82-31.

TURGEON (BELLEDUNE) DEPOSIT 21 P/13W
Gloucester County, New Brunswick

DEVELOPMENTS Esso Minerals moved drill core to N.B. Mineral Resources Division storage at the request of Regional Geologist. However, Heron Mines moved the major part into their own storage building. Granges and Billiton are the latest companies showing some interest.

For more information see Information Circular 83-2.

No new developments have been reported for the following properties:

Stratmat Deposit	21 O/8W
New Horton Copper Uranium	21 H/10E
True Hill Tin-Base Metal	21 G/7W
Duck Lake Uranium	21 G/7 and 10
Upsalquitch Prospect	21 O/8W
Adam Island Copper	21 G/2W, 21 B/15W
Dorchester Copper-Uranium	21 H/15, 21 H/16
St. Stephen Nickel	21 G/3W
Shin Creek Molybdenum-Tungsten-Uranium	21 G/10E
York Mills Uranium	21 G/11E
Jordan Mountain Copper-Uranium	21 H/14W
Midway Copper	21 H/10W
Goshen Copper	21 H/14E
Pleasant Ridge Tin	21 G/7W
Blind Lake Tin	21 G/7W
Deer Lake Tungsten	21 G/7W
Nerepis Zinc-Lead-Copper-Tin	21 G/8W
Evandale Copper-Molybdenum	21 G/9
Key Anacon Sulphide Deposit	21 P/5W

Additional information on the above deposits can be obtained in previous editions of "New Brunswick's Mineral Industry". Please refer to Open File Report 82-31 (for 1981 review) and Information Circular 83-2 (for 1982 review).

CHAPTER 4. ENERGY RESOURCES AND PEAT

OIL AND NATURAL GAS
Stoney Creek Oil and Gas Field 21 H/15

LOCATION The Stoney Creek Field is located 15 km south of the City of Moncton in Albert County.

HISTORY In 1899 the New Brunswick Petroleum Company Limited was organized. Frederick W. Sumner and Mathew Lodge were president and secretary, respectively. The company procured a licence to prospect and develop oil and gas, on an area of 46,619.8 km^2 (18,000 square miles) for 5 years. An extension of 5 years was to be granted should the company meet certain conditions, one of which was an expenditure of $100,000. Upon termination of the five-year extension, Lease 115 was granted specifying that the New Brunswick Petroleum Company Limited had drilling rights to 25,899.9 km^2 (10,000 square miles) for a term of 99 years with a renewal clause for an additional 99 years.

Investigations for the New Brunswick Petroleum Company Limited were conducted by Professor N.S. Shaler, H.B. Goodrich, R.H. Oliphant and others. From 1900 to 1906, 72 wells were drilled in the Dover and St. Joseph areas, one at Beersville in Kent County and four between the Petitcodiac River and the present Stoney Creek Field.

The five wells drilled outside the Dover-St. Joseph area were unsuccessful in locating commercial oil and gas. Half of the 72 wells drilled in the Dover-St. Joseph district yielded oil, the majority ranging from 1/2 to 2 1/2 bbl/day. One well is reported to have produced oil at a rate of 50 bbl/day.

In 1908 Maritime Oilfields Limited (MOL), backed by Scottish and English capital, acquired the drilling rights of the New Brunswick Petroleum Company Limited. In 1909 oil and gas were discovered in what is now the Stoney Creek Field. The first well that was drilled in the Stoney Creek Field, Well MOL 3, yielded some oil and 4247.55 m^3/day (150,000 cu. ft./day)of gas, and Well MOL 5 yielded 28317 m^3/day (1,000,000 cu. ft/day).

Moncton Tramways, Electricity and Gas Company were the gas distributors. Gas was supplied to Moncton by a 24.4 cm (9 5/8 inch) pipeline 16 km in length, and to Hillsboro by a 10.8 cm (4 1/4 inch) pipeline 10.7 km long, built in 1912. In 1913 gas was sold by the distributing company for 38 cents net per 2.83 m^3 (1,000 cu. ft) and 15-16 cents for commercial purposes.

In 1915 the New Brunswick Gas and Oilfields Limited was formed and acquired Lease 115 from Maritime Oilfields Limited. In 1947, New Brunswick Oilfield Limited purchased New Brunswick Gas and Oilfields Limited and farmed out part of the property to Shell, who in 1957 entered a farmout partnership with Imperial Oil. Shell and Imperial drilled 5 and 6 wells, respectively, but failed to discover commercial oil and gas.

Western Decalta Petroleum Limited purchased New Brunswick Oilfields Limited in 1962 with an idea to increase production by the secondary scheme of waterflood. The waterflood, initiated in 1968, increased oil production in a few wells and watered out some of the best gas wells. Subsequently, the waterflood program was abandoned in 1972.

Western Decalta sold the Stoney Creek Field (2119.8 ha) to Aldis Petroleum in 1974, but retained the remainder of the leased land. However, the 99 year lease signed in 1909 on 25,899.9 km^2 (10,000 square miles) was, upon agreement between the New Brunswick Government and New Brunswick Oilfields Limited, reduced to a 21-year lease on January 1, 1958. In addition, 404,743.7 ha were relinquished at the same time and an additional 809,424.3 ha and 1,036,841 ha in 1960 and 1975, respectively. On January 1, 1979 all land except that under production reverted to the Crown.

In 1977, Aldis Petroleum dealt the Stoney Creek Field to Eastern Canada Hydrocarbon Limited of Fredericton, who in turn sold their rights to the present lease holder and operator, Irving Oil Limited.

PRODUCTION Presently, Irving operates the oil wells while Moncton Utility Gas Company operates all gas wells.

The production history of the field is as follows:

Date	Oil (m^3)	Gas (m^3)
1909-1978	122,638,000	791,300,000
1979	729,000,000	2,800,000
1980	604,000,000	2,200,000
1981	321,000,000	2,000,000
1982	103,000,000	1,700,000
1983	754,000,000	1,700,000

EXPLORATION

Chevron Canada Resources Limited and Irving Oil Limited formed a partnership and farmed into the N.B. Oilfields Limited Licences to Search onshore (679,307 ha) and the Mobil-Gulf Licences to Search offshore in the Bay of Fundy (509,983 ha).

In the onshore region in 1983, the partnership carried out 583 km of seismic and equivalent gravity. They plan to continue seismic and gravity surveys in 1984 with hopes of outlining potential drill targets.

In the Bay of Fundy, the partnership drilled an exploratory well 5 km offshore from Cape Spencer (Figure 18). The well was drilled to a depth of 2,583 m, found to be dry, and abandoned. The geological data, however, will serve as a valuable aid in further assessing the petroleum potential of the Bay of Fundy.

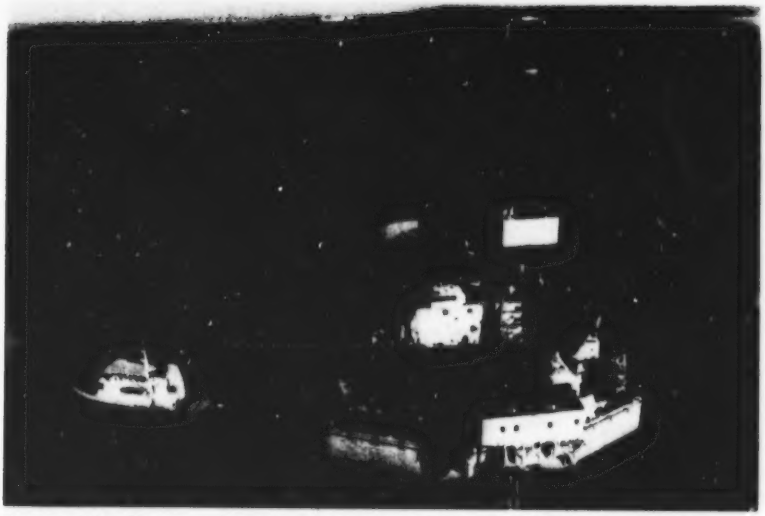

Figure 18. Chevron Canada Resources Limited drill rig in the Bay of Fundy, off Cape Spencer

The partnership, in conjunction with N.B. Oilfields Limited, acquired two additional Licences to Search (66,210 ha) north of Moncton on the New Brunswick Platform. Seismic and gravity surveys are planned for the area in 1984.

Ranchman Resources Limited acquired three Licences to Search in 1983 with plans for a gravity survey to be carried out in 1984.

OIL SHALES

LOCATION The Albert Mines property is located about 25 km south-southeast of Moncton and 6 km southwest of Hillsborough, Albert County.

HISTORY Bituminous shale was first reported at Albert Mines by Dr. Abraham Gesner in 1841. The area is best known for the solid hydrocarbon (albertite) vein that was discovered there by John Duffy in 1851. The vein was mined out between 1852 and 1880.

The importance of the oil shales first gained attention between 1854 and 1856 when Dr. Gesner retorted a burning oil from them. Following the closure of the albertite mine in 1880, the area attracted little interest until 1902 when R.W. Ells of the Canada Department of Mines began to study the oil shales. In 1942 the Canada Department of Mines drilled 36 shallow core holes near the old mine. In 1968, the Atlantic Richfield Company Limited drilled 2 holes at Albert Mines. One of these holes assayed 63 L/t of shale oil over 130 m.

COMPANY The property is presently held by Canadian Occidental Petroleum Limited, 1500, 635 - 8th Avenue S.W., Calgary, Alberta T2P 3Z1

DEVELOPMENTS In 1974 Canadian Occidental Petroleum Limited acquired the rights to the Albert Mines area by means of a Licence to Search for over 404,700 ha in southeastern New Brunswick. They converted this licence in 1981 to a lease of about 29,138 ha. Between 1974 and 1981 nine core holes were drilled and a high-grade oil shale zone partially delineated. In 1983 the lease area was reduced to 1,439 ha.

No further exploration work was carried out in 1983.

FINANCIAL Since the closure of the Albertite mine in 1880, in excess of $500,000 has been expended on core drilling, assay work and geological surveys.

RESERVES AND GRADE In 1942 the Canada Department of Mines estimated there were 90,900,000 tonnes of oil shale averaging 44 L/t yielding about 300,000 barrels of shale oil to a depth of 120 m. In 1982 the Geological Survey of Canada and the New Brunswick Department of Natural Resources estimated there were about 270,000,000 barrels in situ to a depth of 600 m.

Although present stabilization in conventional world oil supplies had downgraded the importance of New Brunswick's oil shales, drilling and assay evidence indicate that the property has a good potential for an open pit oil shale mine.

A second area of 28,776 ha optioned by Petro-Can in the region of Dover, was dropped in 1983 after drilling three holes to a total depth of 964 m.

COAL

Minto-Chipman Coal Field 21 I/4, 21 J/1

LOCATION The coal field is about 60 km northeast of Fredericton in the Minto-Chipman area, Sunbury and Queens County.

HISTORY The first recorded shipment of coal in North America dates back to 1639 when coal from the shores of Grand Lake was shipped to Boston. Early mining methods included hand stripping and short adits into coal outcrops along streams. Draglines and steam-shovels first operated in the early 20th century with draglines assuming an ever increasing proportion of production until 1971 when the last underground coal mine was shut down.

N.B. Coal Limited was formed in 1969 to consolidate mining and to phase out less profitable operations. Markets for the high ash, high sulphur coal were being lost due to traditional users converting to cheaper and cleaner energy sources. In 1973, the Arab oil embargo and rapid increase in OPEC oil prices resulted in a change of attitude towards coal in all industrialized countries. N.B. Coal Limited expanded coal production capabilities with the addition of a Marion 8200 dragline. The dragline, with a 107 m boom, a 95 m dumping radius and a 50 m^3 bucket, commenced production in 1979. This dragline presently accounts for 50% of the company's production.

In total, N.B. Coal Limited operates 5 draglines in addition to contracting the services of 2 other draglines. The combined earth moving capacity is 21,000,000 m^3 and production in 1983 was 564,640 tonnes. Reserves are estimated at approximately 16,000,000 tonnes including measured, indicated and inferred reserves. Company employment totals 250 but approaches 300 when considering all the contractors involved.

N.B. Coal Limited has recently undertaken an exploration program designed to evaluate coal reserves in its entire 950 km^2 mining licence. Previous exploration had centred on proving up reserves at operating sites as well as step-outs from known occurrences. The present exploration program will include approximately 50% of the mining licence not previously explored.

Beersville Coal Deposit 21 I/6

The Beersville coal deposit is held jointly by Ciment-St. Laurent Inc. and Provincial Holdings Limited. The deposit has been known since 1849 with early mining attempts by underground methods. Stripping operations were undertaken in the mid-fifties by two companies from Minto.

In 1974 and 1975 claims were staked by the Beersville Coal Joint Venture Group of Camflo Mines Limited, Canadian Reynolds Metals Company Limited and Lynx-Canada Explorations Limited. In 1975, exploration using percussion rotary and diamond drilling proved up approximately 16,000,000 tonnes of coal.

The property was assigned to Ciment-St. Laurent Inc. in 1979 and offers good prospects for future development.

No work was reported in 1983.

Lake Stream Coal Deposit 21 I/6

Claims were staked on this property in 1975. Preliminary estimates from a 31 percussion drill hole exploration program indicates 1,000,000 tonnes of coal at a shallow depth with potential for greater amounts.

In 1979 the property converted to a mining licence which was transferred from the Lake Stream Joint Venture Group of Camflo Mines Limited, Canadian Reynolds Metals Company Limited and Lynx-Canada Explorations Limited to Ciment-St. Laurent Inc.

No work was reported in 1983.

PEAT

Peat deposits occur in eastern and northeastern New Brunswick.

Peat mining has been going on in New Brunswick since 1941 when Conrad Fafard commenced production from Bog No. 530 at Inkerman Ferry. Initial peat moss production was by hand-cut methods but mechanization emerged in the sixties with the advent of the block-cut harvester. In the seventies peat production moved from block-cut to milled peat using the process of harrowing to dry followed by vacuum mining. The milled peat method is more productive than block-cut but does produce a finer-textured product. As a result, several producers have diversitied to produce both milled and block-cut peat; other producers are proceeding in this direction.

Thirteen companies were producing from 16 bogs in 1983. In addition, 2 of the 13 companies held another 3 bogs not put into production. Four other companies have peat leases on another 4 bogs. Thus 17 companies have peat leases on 23 bogs totalling 9,002 ha.

Peat Production

Year	Bale Equivalents*
1980	2,301,000
1981	2,973,000
1982	3,035,000
1983	3,900,000

ACADIAN PEAT MOSS (1979) LIMITED — 21 P/15E

LOCATION The Acadia bog (No. 568) is on Couteau Road, on Lameque Island.

HISTORY Acadia Peat Moss was established in 1965. Initial production consisted of block-cut peat. The company produces milled peat and block-cut.

ATKINS & DURBROW — 21 P/15W

LOCATION The Atkins & Durbrow bog (No. 600) is on Pokesudie Island.

HISTORY Atkins & Durbrow have produced peat since 1886. They commenced New Brunswick operations in 1965. Fire destroyed the bagging plant in 1978, but it was rebuilt and in operation by late 1980.

FISONS WESTERN CORPORATION — 21 P/10E, 21 P/15E, 21 P/14E

LOCATION Fisons Western operates on bog 591, Lameque Island; bog 592,6 km east of Lameque; and Bog 562, Maisonnette.

HISTORY Western Peat Moss Company Limited started production in British Columbia in 1938-39. Commercial production in New Brunswick commenced in 1964 on Bog 562. Western produced on Bog 527 (1 km south of Shippagan) from 1942-48 and commenced production from Bog 562 in 1963. Atlantic produced from Bog 527 from 1953 to 1970-71. They also produced from Bog 591 commencing in 1952. Western acquired Atlantic in 1970 and continued production from Bogs 562 and 591. Fisons acquired Western Atlantic in 1980 and incorporated under the name of Fison Western Inc. in 1981. Subsequently, the new plant on bog 591 on Lameque Island opened in 1981. The products are baled peat and high compression peat.

*1 bale equivalent = 170 dm^3 at a 2:1 compression ratio.

FAFARD PEAT MOSS COMPANY LIMITED 21 P/10W
21 P/15W

LOCATION Bog 529 is 8 km southwest of Shippagan (Inkerman Ferry Bog), Bog 520 is on Rte. 113 Inkerman (Pokemouche Bog); and Bog 532 is 15 km south of Shippagan (Six Road Bog).

HISTORY Fafard started its operations at Bog 530 in 1941. Initially the company produced block-cut hand-cut peat. Similarly at Bog 532 operations shifted to milled peat in 1966. Mechanized block-cut peat production commenced in 1971 and ceased in 1977. Presently peat is produced from three bogs. Products are baled peat and peat mixes.

LA TOURBE CHIASSON LTEE. 21 P/15E

LOCATION Bog 567 is 3 km southeast of Little Shippagan.

HISTORY The company obtained a peatland exploration licence in 1982, converted it to a lease in 1982 with production commencing in 1983.

ASB CANADA LIMITED 21 I/15W

LOCATION Bog 324 E is 1 km northwest of Pointe Sapin.

HISTORY The company commenced site preparation in 1978 and acquired a lease in 1982. Products are baled peat and peat mixes.

GRANDE ANSE PEAT MOSS COMPANY LIMITED 21 P/14E

LOCATION Bog 561 is 3 km southeast of Grande Anse.

HISTORY Grande Anse Peat Moss started block-cut peat operations in 1961. The hand-cut operation was mechanized in 1966. The company started conversion to milled peat in 1977. Products are baled peat and peat mixes.

HEVECO LIMITED 21 P/7W

LOCATION Bog 522 is 2 km east of Brantville and Bog 524 is 2 km southeast of Tabusintac.

HISTORY The company was incorporated in 1962. It produces block-cut peat and peat mixes. Heveco commenced milled peat production in 1981. Products are baled peat, peat mixes and peat soil replacer.

LA TOURBE PIGEON HILL LTEE. 21 P/15E

LOCATION Bog 569 is near Pigeon Hill on Lameque Island.

HISTORY The company acquired the lease in 1979, and commenced production of milled peat in 1980.

PORTAGE PEAT MOSS LIMITED 21 P/7W

LOCATION Bog 517 is 1.5 km east of Portage River, Northumberland County.

HISTORY Portage Peat Moss Limited was established in 1972 and has produced milled peat since 1973.

THERIAULT & HACHEY 21 P/2W

LOCATION Bog 324 W is 6 km south of Eel River Bridge.

HISTORY The company was formed in 1961. It started production of block-cut peat that year and continued until 1977 when the company converted to milled peat. Their product is baled peat.

LAMEQUE PEAT MOSS LIMITED 21 P/15E

LOCATION Bog 580 is 4 km north of Lameque.

HISTORY The company was established in 1971 and produces milled peat. Products are baled peat and peat mixes.

ST. RAPHAEL PEAT MOSS LIMITED 21 P/15E

LOCATION Bog 576 is 4 km east of Haut Lameque, Lameque Island.

HISTORY The company acquired the lease in 1977. St. Raphael Peat Moss Limited is associated with Lameque Peat Moss Limited. Their product is baled peat.

Companies possessing peat leases but not in production in 1983 include:

Burnt Church Peat Moss Company Limited, Shippagan; Bog No. 353.
Gulf Peat Company Limited, Point Escuminac; Bog No. 338.
Les Equipments Tardif Inc., Riviere du Loup, Quebec; Bog No. 41.
Malpec Peat Moss Limited, Neguac; Bog 213 (Rexton).

PEAT EXPLORATION

Peatland exploration licences effective in 1983 were:

Jiffy Peat Products Limited in the St. Isidore Station area.
Theriault and Hachey, south of Eel River Bridge.
Tardif et Freres in Rogersville area.

CHAPTER 5. INDUSTRIAL MINERALS

PRODUCING MINES

LIMESTONE AND DOLOMITE

BROOKVILLE MANUFACTURING COMPANY LIMITED 21 H/5

Brookville Manufacturing Company Limited continued to operate a quarry in East Saint John, producing about 100,000 tonnes of agricultural dolomite and 200,000 tonnes of construction aggregate annually. The quarry has been operating continuously for over 60 years in what was formerly known as the Lawlor quarry. Reserves are estimated as adequate for at least 10 years at the present rate of consumption, although the company has been subjected to increasing land-use pressures in recent years.

Market demand is directly related to construction activities as well as climatic conditions in spring and fall for "ag lime" application.

ELMTREE RESOURCES LIMITED 21 P/13W

Elmtree Resources Limited operates a limestone quarry located about 20 km north of Bathurst near the Village of Petit Rocher, Gloucester County. A quarry has existed on this site since 1880 and was operated on a 1,814.4 t/year (2,000 ton/year) basis from 1930 to 1960 by Elmtree Co-op. Since 1960 it was operated on an intermittent basis until 1978 when it was acquired by Elmtree Resources Limited. Following extensive trenching and mapping, the quarry was expanded to include a crushing, screening plant and a large storage facility. Reserves have been estimated at about 7,000,000 million tonnes with a cut-off grade of 50% CaO although recent trenching south and east of the existing quarry has indicated that the highest quality stone is restricted to a number of limestone lenses.

In 1983, about 50,000 tonnes of limestone was quarried, crushed and sold as smelter flux to Brunswick Mining and Smelting Corporation Limited for use in their lead smelter. Agricultural lime and construction stone were also produced in 1983.

In 1983 Elmtree Resources Limited concluded a quarry lease with the Province for property located at Armstrong Brook in Gloucester County. A limited amount of dolomitic "ag lime" and construction stone was produced in 1983 following completion of an access road. Reserves are estimated to be in excess of 2,000,000 tonnes of agricultural grade dolomite.

CANADA CEMENT LAFARGE LIMITED 21 I/3W

Canada Cement Lafarge Limited operates a limestone quarry at Havelock, Kings County producing about 300,000 tonnes annually for use in cement manufacture. The quarry has been supplying raw material to the nearby cement plant since 1952 and present reserves are adequate for at least 10 years at the present rate of consumption. More recently the quarry has also supplied raw material to Havelock Processing Limited for use in quicklime production.

Canada Cement Lafarge Limited also holds extensive reserves of limestone, estimated in excess of 100,000,000 tonnes, to the east of the present quarry as well as at Springhill.

Although Canada Cement Lafarge Limited continued cement production in 1983, on July 27, 1983 they announced a move to shut down the cement kilns when inventory storage was full. Plans for the latter part of 1983 and 1984 called for only operation of only the grinding plant, and grinding clinker for cement production.

Rationale cited by Canada Cement Lafarge Limited for shutting down the kiln operation at Havelock were:

(1) Reduced cement consumption throughout the Maritimes. The New Brunswick market alone has fallen over 40% since 1979.

(2) Reduced U.S. demand caused by the recession and increased competition from Europe aided by currency devaluation, and

(3) Continued pressure from cement coming in from outside the Maritimes.

HAVELOCK LIME WORKS LIMITED 21 H/14W

Havelock Lime Works Limited operates a limestone quarry at Samphill, Kings County, producing about 300,000 tonnes annually for use in quicklime manufacture, "ag lime", and general construction stone. The quarry is located about 5 km southwest of Havelock and is estimated to contain less than 1,000,000 tonnes of chemical-grade limestone. Quarrying has taken place since 1969, but the more recent output from this site has been supplemented by purchase of stone from the Canada Cement Lafarge Limited quarry.

In the latter part of 1983 Dickenson Mines Limited announced that they would purchase the assets of the Havelock Lime group of companies in two stages, sixty per cent of the assets in January 1984 with the remainder in January 1987. For the initial 3-year period the two companies are to be partners in the lime works and share earnings as to their proportionate interests.

Future quicklime manufacture by Havelock Processing Limited will require Havelock Lime Works Limited reaching an agreement with Canada Cement Lafarge Limited to obtain chemical-grade stone from areas presently held under their mining licence.

POTASH-SALT

POTASH COMPANY OF AMERICA — 21 H/11W, 14W

This property is located 5 km east of the Town of Sussex, Kings County. Following the discovery of potash in the Plumweseep-Penobsquis area by the New Brunswick Department of Natural Resources (Plumweseep No. 1) in 1971, exploration and development rights covering a 360 km^2 reservation area were granted to the Potash Company of America in 1973. The company currently holds a 19,187.0 hectare mining lease. After a comprehensive exploration program and feasibility study, the company decided to proceed with the construction of a 5 m diameter exploratory mine shaft in the spring of 1978. The exploration shaft was completed in April of 1980 and underground exploration in October 1980. On October 27, 1980 the Potash Company of America announced that it was proceeding to production with a mine capacity of 900,000 tonnes per year. Reserve estimates indicate tonnages sufficient to support a 20- to 30-year mine life.

Mine development, mill construction and the Courtenay Bay potash terminal were completed in 1983. July 17, 1983 saw the first potash produced from the mill. The first shipment of potash through the port facility in Saint John is expected early in 1984.

Salt production reached in excess of 400,000 tonnes in 1983 with salt sales being handled by Iroquois Salt Products Limited under an agreement with Potash Company of America. Salt produced was of both chemical and highway grade.

SILICA

CHALEUR SILICA LIMITED — 21 P/12E

Chaleur Silica Limited operates a quarry located approximately 6.5 km northeast of Bathurst in a silica-rich sandstone band in the extensive Clifton Formation. Reserves are estimated to be in excess of 500,000 tonnes of 95% SiO_2.

The property was originally explored by East Coast Smelting and Chemical Company Limited in the early 60's and a quarry was opened by Worldwide Explorations in 1974. In 1976, the quarry was purchased by Godin M & E and is operated under the name of Chaleur Silica Limited.

The quarry is operated on a seasonal basis and produced in the order of 60,000 tonnes of silica in 1983. Markets included silica flux at the Belledune lead smelter, blasting sand and silica for low alkali cement production by Canada Cement Lafarge Limited in Havelock.

PROPERTIES RECENTLY EXPLORED AND/OR UNDER DEVELOPMENT

LIMESTONE AND DOLOMITE

ARMSTRONG BROOK DOLOMITE 21 P/12W

This dolomite deposit is located about 22 km west of Bathurst, immediately north of Armstrong Brook. Sampling by Elmtree Resources Limited in 1982, who own the mineral rights, has resulted in the delineation of an excess of 2,000,000 tonnes of high-grade dolomite.

An access road was constructed in 1983 and limited production commenced. Plans for 1984 call for installation of additional crushing equipment to handle the hard dolomite for "ag lime" and construction stone production.

A quarry lease for the 59.10 ha property was signed with the Province in 1983.

SORMANY LIMESTONE 21 O/9

This limestone deposit is located about 30 km west of Bathurst, adjacent to the Millstream River. Mineral rights are held by Elmtree Resources Limited, who completed a sampling program in 1982. Results indicate an excess of 4,000,000 tonnes of high-grade calcic limestone suitable for quicklime and slaked lime production.

In 1983, work continued into the feasibility of constructing a lime-burning kiln. A quarry lease for the 84.3 ha property was signed with the Province in 1983.

Work was not reported on the following deposits:

Alward (McGee) Limestone
Springhill Limestone
Parlee Brook Limestone
Glebe Mines Limestone
Lorneville Dolomite
Ketepec Limestone
Elliot Road Dolomite
Elliot Road Limestone
Nauwigewauk Limestone
Windsor and Craig Brook Limestone

MANGANESE

Work was not reported on the following properties:

Woodstock Manganese
St. Leonard Iron and Manganese.

POTASH, SALT

MILLSTREAM POTASH-SALT 21 H/12E

This company is located 4 km east of Apohaqui, Kings County (10 km southwest of Sussex). A drill hole (Millstream No. 1) completed in 1973 by the Department of Natural Resources penetrated about 12 m of potash-bearing salt at a depth of approximately 915 m before abandonment was caused by technical difficulties.

In May of 1980 the Province called for tenders for the right to explore and develop a salt-potash prospect at Millstream and 5 tenders were received. After careful evaluation the Province awarded the rights to BP Exploration Canada Limited. Under the exploration agreement BP agreed to a 6 1/4% royalty on all potash produced as well as 21.1% share of the accumulated value of net cash profits after earning a discounted cash profit return on investment of 15% before deducting Federal and Provincial corporation taxes. Drilling on the property commenced in 1981.

By the end of 1983 a total of 11 holes had been drilled and a feasibility study, including geology, mining methods, milling and marketing, was underway. The company has indicated that it will ask for a one-year extension to the exploration agreement in order to complete the study and make a decision to sink a shaft pilot hole.

SALT SPRINGS POTASH-SALT 21 H/12E

The Salt Springs potash-salt deposit is located about 20 km southwest of Sussex, Kings County and was discovered by the Department of Natural Resources in 1973. Subsequent exploration and development rights to a 120 km^2 reservation area were granted to International Minerals and Chemical Corporation (I.M.C.). Full-scale exploration involving 22 drill holes began in 1975, and was successful in confirming sufficient ore to support a 1,000,000 tonne per year plant for 20 to 30 years.

Despite extremely encouraging results of the drilling program, I.M.C. decided to sell the property to Denison Mines Limited of Toronto late in 1978. Construction of a 5 m diameter exploration mine was commenced in September 1979 and reached a target depth of 835 m.

In December of 1980 Denison Mines Limited assigned a 40% interest to the Potash Company of Canada Limited (Potacan). Potacan is owned jointly by Entreprise Miniere et Chemique, and Kail and Salz Ag. Denison Mines Limited remains the overall development manager, with potash sales to be handled by Potacan.

Underground exploration in 1982 has blocked-out over 41,000,000 tonnes of 28.5% K_2O, sufficient for the initial 5 years of production. Together with the 22 surface drill holes, the underground work to date has established total reserves of 230,000,000 tonnes (proven and possible). A feasibility study completed in 1982 resulted in a production decision announcement on February 7, 1983.

Sinking of the No. 2 shaft commence in 1983 and had reached a depth of 415 m at year's end. Work underground involved test stope development and testing of the Alpine Miner A.M. 100. Surface work included site clearing and preparation for surface plant footings and tailings and brine impoundment. The brine pipeline route to the Bay of Fundy has been surveyed although final approvals from environmental officials have to be obtained.

Production is planned for September 1985 with a rated capacity of 1,300,000 product tonnes annually. Employment during construction will peak at 575 persons and permanent employment at the mine site and port facility will total 400.

DORCHESTER POTASH-SALT

No further work was carried out on this prospect.

SILICA

SUSSEX SILICA

An unconsolidated high-grade silica sand deposit has been discovered about 16 km south of Sussex, immediately northeast of Cassidy Lake. The property is held by Lockhart Exploration Services Limited. Sampling indicates 9,000,000 tonnes proven and over 22,000,000 tonnes indicated reserves of silica sand containing greater than 98% SiO_2.

Laboratory testing has indicated that the silica sand could meet specifications for glass and blasting sand production with minimum beneficiation. Use as foundry sand would not appear possible due to the angular shape which would have insufficient permeability.

The pilot plant, using a wet processing technique, processed 25,000 tonnes in 1983 for product testing and marketing. Results were encouraging and work on establishing markets and project financing were continuing at year's end.

Work was not reported on the following properties:

Burchill Road Silica
Nantucket Island Silica
Whitehead Island Silica
West Beach-Cape Spencer Silica

GYPSUM

INTERVALE GYPSUM 21 H/14E

The Intervale deposit is situated north of Petitcodiac, between Hillgrove and Intervale.

Initial quarrying occurred in 1880. The Albert Manufacturing Company produced 1,180 tonnes per year (1300 tons per year), between 1932 and 1935. In 1950, the property was acquired by Canada Cement Company Limited who operated the quarry on an annual basis.

The property is estimated to contain 3,628,800 tonnes (4 million tons) of gypsum grading 97% $CaSO_4$. The quarry is capable of producing 4,536 to 27,216 tonnes per year (5,000-30,000 tons per year), as required by Canada Cement plant in Havelock where it is used as a portland cement retarder. Recent production cutbacks have reduced the demand for gypsum from this quarry. No change is anticipated in the foreseeable future.

HILLSBOROUGH GYPSUM 21 H/15E

All mineral rights formerly owned by the Canadian Gypsum Company Limited were surrendered to the Province in 1982. No work was reported on these properties in 1983.

CHAPTER 6. CONSTRUCTION MATERIALS

Minerals produced in New Brunswick in direct support of the construction industry include sand, gravel, crushed stone, stone, cement, lime clays and shales. Many of these commodities are high bulk, low unit value and transportation cost-sensitive. In addition, operations producing these commodities are generally the first mineral-associated industries to be influenced by changes in the economic climate.

The value of construction materials produced in New Brunswick in 1983 was $33,400,000 (preliminary estimate, Statistics Canada) compared to $43,240,000 in 1982. The value is equal to 6.5% of the total mineral production value in the Province.

CEMENT

Canada Cement Lafarge Limited continued to operate a cement manufacturing plant at Havelock, New Brunswick in 1983. The plant, which was built in 1951, was expanded in 1966 by addition of a second kiln. In 1974 the company installed heavier grinding equipment and larger storage facilities bringing production capacity to 285,000 tonnes per year.

On July 27, 1983 the company announced plans to shut down its kiln operations due to poor markets and just operate the grinding plant. These conditions are expected to continue throughout 1984.

Preliminary estimates of the production value of cement in 1983 are $11,200,000 compared to $17,170,000 in 1982.

LIME

Lime is produced by Havelock Processing Limited at Havelock, New Brunswick. The company produces a high-calcium quicklime utilizing an 81.6 tonne per day rotary kiln. Markets include mineral processing operations and pulp and paper industries both within the Province and within the State of Maine. Havelock Lime Works Limited operates the company's crushed limestone plant which offers a range of products from agricultural limestone, crushed stone for concrete and asphaltic aggregates to finely pulverized filler material.

In late 1983 Dickenson Mines Limited announced that they would purchase the assets of the Havelock Lime group of companies in two stages, sixty per cent of the assets in January 1984 with the remainder in January 1987. For the initial 3-year period the two companies will be partners in the lime works and share earnings as to their proportionate interests.

Brookville Manufacturing Company Limited operates a crushing plant producing a crushed dolomitic limestone for use as agricultural limestone, concrete and asphaltic aggregate and finely pulverized filler material. Elmtree Resources Limited of Bathurst produces crushed limestone from its limestone deposit in Gloucester County for use as a flux in mineral processing and agricultural lime.

Preliminary estimates of the value of lime production in 1983 are $3,540,000 compared to $3,940,000 in 1982.

CLAY PRODUCTS

L.E. Shaw Limited continued to operate a brick plant at Chipman, New Brunswick using a local red shale. This plant produces facing brick, drainage tile, partition tile, radial tile and an interlocking tile.

Preliminary estimates of the value of clay product production in 1983 are $1,260,000 compared to $2,200,000 in 1982.

STONE

BUILDING STONE

Nelson Monuments Limited of Sussex continued to produce monuments, markers and curbing although much of the granite used was imported from Ontario and South Africa.

Acadian Granite Limited of Bathurst did not produce ashlar stone from its Antinouri Lake granite quarry during 1983 and dropped their quarry lease.

CRUSHED STONE

Moncton Crushed Stone Company Limited, a subsidiary of Modern Enterprises, continued to produce crushed stone at Stilesville, Westmorland County. This company also continued production of manufactured fine concrete aggregate by washing sand brought in from Rogersville, and blending it with -1/4 inch mesh crushed stone.

Moncton Crushed Stone Company Limited is the main supplier of aggregate in the Moncton and surrounding areas, with their products being solid to concrete and paving companies and individuals.

H.E. Carson Limited operated a quarry in the Stilesville area, producing crushed stone and rip rap.

Acadia Crushed Stone Limited, another subsidiary of Modern Enterprises, produced crushed stone from its plant at Gayton, Westmorland County. MacDonald's Paving and Construction Limited also produced crushed stone from a second quarry at Gayton.

Forbes and Sloat operated a quarry and crusher operation at Douglas, outside Fredericton.

Diamond Construction Limited continued to operate its quarry and crushing plant at Springhill. The material crushed is greywacke.

Brookville Manufacturing Company Limited of Brookville, Saint John County, and Havelock Lime Works Limited continue to produce crushed limestone for concrete and asphaltic aggregate.

Preliminary estimate of stone produced in 1983 is 2,140,000 tonnes at a value of $9,750,000 compared to 2,260,000 tonnes at a value of $11,560,000 in 1982.

SAND AND GRAVEL

Sand and gravel may be extracted in New Brunswick by obtaining permission of the landowner as the rights to such commodities are vested in the landowner. As such, the Province controls approximately 42% of the land and allows removal of sand and gravel from this land by permit issued by the Minister of Natural Resources under the Quarriable Substances Act.

Preliminary estimates of sand and gravel production in 1983 (Statistics Canada figures) indicate that production was at 5,400,000 tonnes with a value of $7,630,000 compared to 6,200,000 tonnes with a value of $8,630,000 in 1982.

Figures for the quantity of sand and gravel removed from Crown lands in 1983 are accurately computed to be 1,210,000 tonnes at a value of $1,800,000 compared to 1.67 million tonnes with a value of $2,5120,000 in 1982.

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